

Glades Reservoir DEIS



APPENDIX S BIOLOGICAL RESOURCES

AGENCY COORDINATION

THE JURISDICTIONAL WATERS REPORT (KLEINSCHMIDT, 2011)

BAT SURVEY

October 2015



MARK WILLIAMS
COMMISSIONER

DAN FORSTER
DIRECTOR

July 10, 2014

Chris Covington
Environmental Planner
AECOM
One Midtown Plaza
1360 Peachtree Street, Suite 500
Atlanta, GA 30309

Subject: Known occurrences of natural communities, plants and animals of highest priority conservation status on or near proposed reservoir sites in White, Hall, and Habersham Counties, Georgia

Dear Mr. Covington:

This is in response to your request of May 12, 2014. According to our records, within a three-mile radius of the project site, there are the following Natural Heritage Database occurrences:

Hall County Flat Creek location approximate midpoint: (-83.74245, 34.42678; NAD27):

GA *Haliaeetus leucocephalus* (Bald Eagle) approx. 2.5 mi. S of site
Pituophis *melanoleucus melanoleucus* (Northern Pine Snake) approx. 1.5 mi. W of site
DON CARTER SP [GDNR] approx. 1.5 mi. S of site
LULA BRIDGE WMA [GDNR] approx. 1.0 mi. SE of site
Chattahoochee River [High Priority Stream] approx. 3.0 mi. E of site

White County Flat Creek / White Creek location approximate midpoint (-83.653647, 34.536596):

GA *Cyprinella callitaenia* (Bluestripe Shiner) approx. 2.5 mi. NE of site in the Chattahoochee River
GA *Cyprinella callitaenia* (Bluestripe Shiner) [HISTORIC] approx. 2.5 mi. W of site in Mossy Creek
Melanthium latifolium (Broadleaf Bunchflower) approx. 2.0 mi. NE of site
Micropterus cataractae (Shoal Bass) approx. 2.5 mi. NE of site in the Chattahoochee River
Micropterus cataractae (Shoal Bass) approx. 2.5 mi. S of site in the Chattahoochee River
Moxostoma lachneri (Greater Jumprock) approx. 2.0 mi. NE of site in the Chattahoochee River
GA *Notropis hypsilepis* (Highscale Shiner) [HISTORIC?] approx. 2.0 mi. NE of site
GA *Percina crypta* (Halloween Darter) approx. 2.0 mi. NE of site in the Chattahoochee River
BUCK SHOALS SP [GDNR] approx. 1.5 mi. NE of site
MOSSY CREEK SP [GDNR] approx. 2.5 mi. SW of site

Chattahoochee River [High Priority Stream] approx. 1.0 mi. SE of site

Habersham County Mud Creek location approximate midpoint (-83.597956, 34.516924):

BUCK SHOALS SP [GDNR] approx. 2.5 mi. NW of site

Chattahoochee River [High Priority Stream] approx. 2.0 mi. NW of site

Hall and Habersham Counties Mud Creek / Little Mud Creek location approximate midpoint (-83.65332, 34.45646; NAD27):

GA *Cambarus howardi* (Chattahoochee Crayfish) [HISTORIC?] on site in Mud Creek

GA *Cyprinella callitaenia* (Bluestripe Shiner) approx. 0.5 mi. E of site in Little Mud Creek

GA *Cyprinella callitaenia* (Bluestripe Shiner) approx. 1.5 mi. SW of site in the Chattahoochee River

GA *Cyprinella callitaenia* (Bluestripe Shiner) approx. 2.0 mi. NW of site in the Chattahoochee River

GA *Cyprinella callitaenia* (Bluestripe Shiner) approx. 3.0 mi. N of site in Mossy Creek

Micropterus cataractae (Shoal Bass) approx. 2.0 mi. NW of site in the Chattahoochee River

Micropterus cataractae (Shoal Bass) approx. 2.0 mi. W of site in the Chattahoochee River

LULA BRIDGE WMA [GDNR] 0.5 mi. SW of site

MOSSY CREEK SP [GDNR] approx. 2.5 mi. NW of site

Chattahoochee River [High Priority Stream] approx. 1.5 mi. SW of site

“GA” indicates Georgia protected species.

Please be aware that a record of a nesting Bald Eagle (*Haliaeetus leucocephalus*) is within three miles of the proposed Hall County Flat Creek project site. Although the Bald Eagle is no longer considered an endangered species, it is still protected by the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act and the Georgia Endangered Species Act. These Acts continue to protect bald eagles from potentially harmful human activities. For more information on how to prevent impacts to bald eagles that could violate the Eagle Act, download the National Bald Eagle Management Guidelines:

<http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>

Disclaimer:

Please keep in mind the limitations of our database. The data collected by the Nongame Conservation Section comes from a variety of sources, including museum and herbarium records, literature, and reports from individuals and organizations, as well as field surveys by our staff biologists. In most cases the information is not the result of a recent on-site survey by our staff. Many areas of Georgia have never been surveyed thoroughly. Therefore, the Nongame Conservation Section can only occasionally provide definitive information on the presence or absence of rare species on a given site. Our files are updated constantly as new information is received. **Thus, information provided by our program represents the existing data in our files at the time of the request and should not be considered a final statement on the species or area under consideration.**

If you know of populations of highest priority species that are not in our database, please fill out the appropriate data collection form and send it to our office. Forms can be obtained through our web site (<http://www.georgiawildlife.com/node/1376>) or by contacting our office. If I can be of further assistance, please let me know.

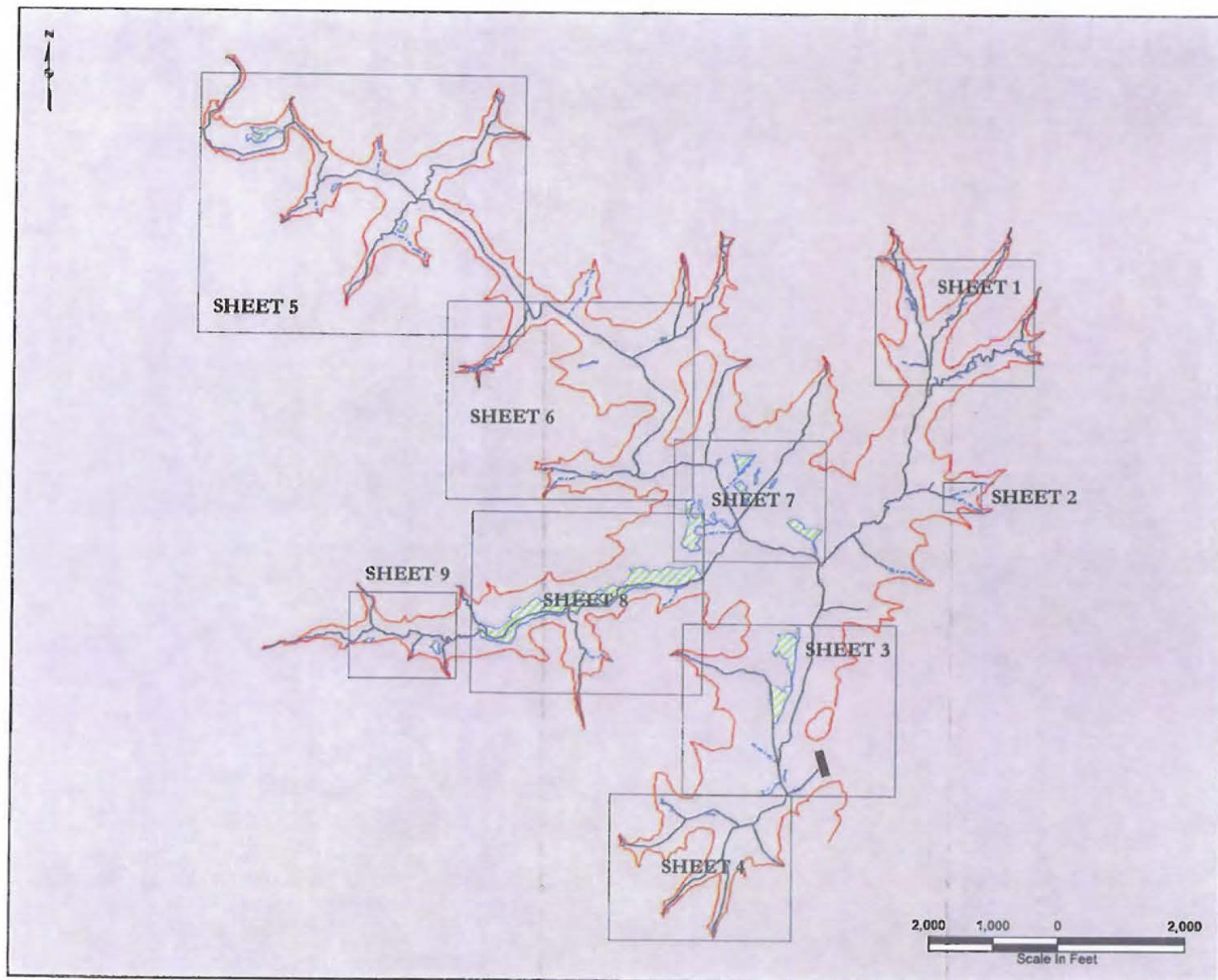
Sincerely,



Anna Yellin
Environmental Review Coordinator

Data Available on the Nongame Conservation Section Website

- Georgia protected plant and animal profiles are available on our website. These accounts cover basics like descriptions and life history, as well as threats, management recommendations and conservation status. Visit <http://www.georgiawildlife.com/node/2721>.
- Rare species and natural community information can be viewed by Quarter Quad, County and HUC8 Watershed. To access this information, please visit our GA Rare Species and Natural Community Information page at: <http://www.georgiawildlife.com/conservation/species-of-concern?cat=conservation>.
- Downloadable files of rare species and natural community data by quarter quad and county are also available. They can be downloaded from: <http://www.georgiawildlife.com/node/1370>.

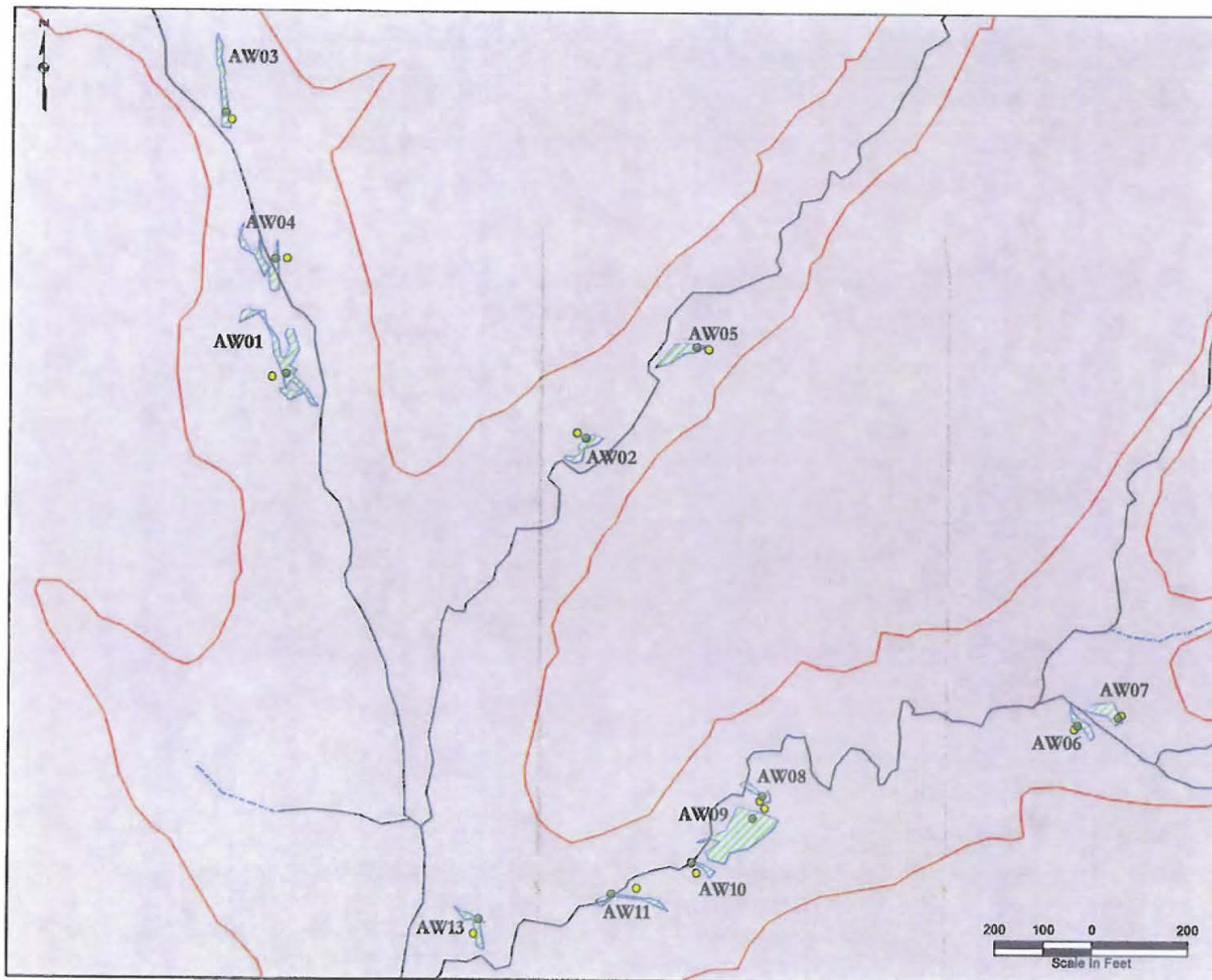


- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)
- Location of Proposed Dam
- Sheet Extent

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

Kleinschmidt Project No. 1051001.01
May 2011

WETLANDS MAP INDEX
JURISDICTIONAL WATERS REPORT FIGURE 5
HALL COUNTY, GEORGIA



- Paired Data - Upland
- Paired Data - Wetland
- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS AND PAIRED DATA PLOT LOCATIONS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

Kleinschmidt Project No. 1851001.01
May 2011

WETLANDS MAP 1 OF 9

JURISDICTIONAL WATERS REPORT
FIGURE 6

HALL COUNTY, GEORGIA

Kleinschmidt
Environmental Science & Technology
1000 Peachtree Street, N.E.
Atlanta, Georgia 30309
Phone: 404.525.1100
Fax: 404.525.1101
www.kleinschmidt.com



- Paired Data - Upland
- Paired Data - Wetland
- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS AND PAIRED DATA PLOT LOCATIONS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

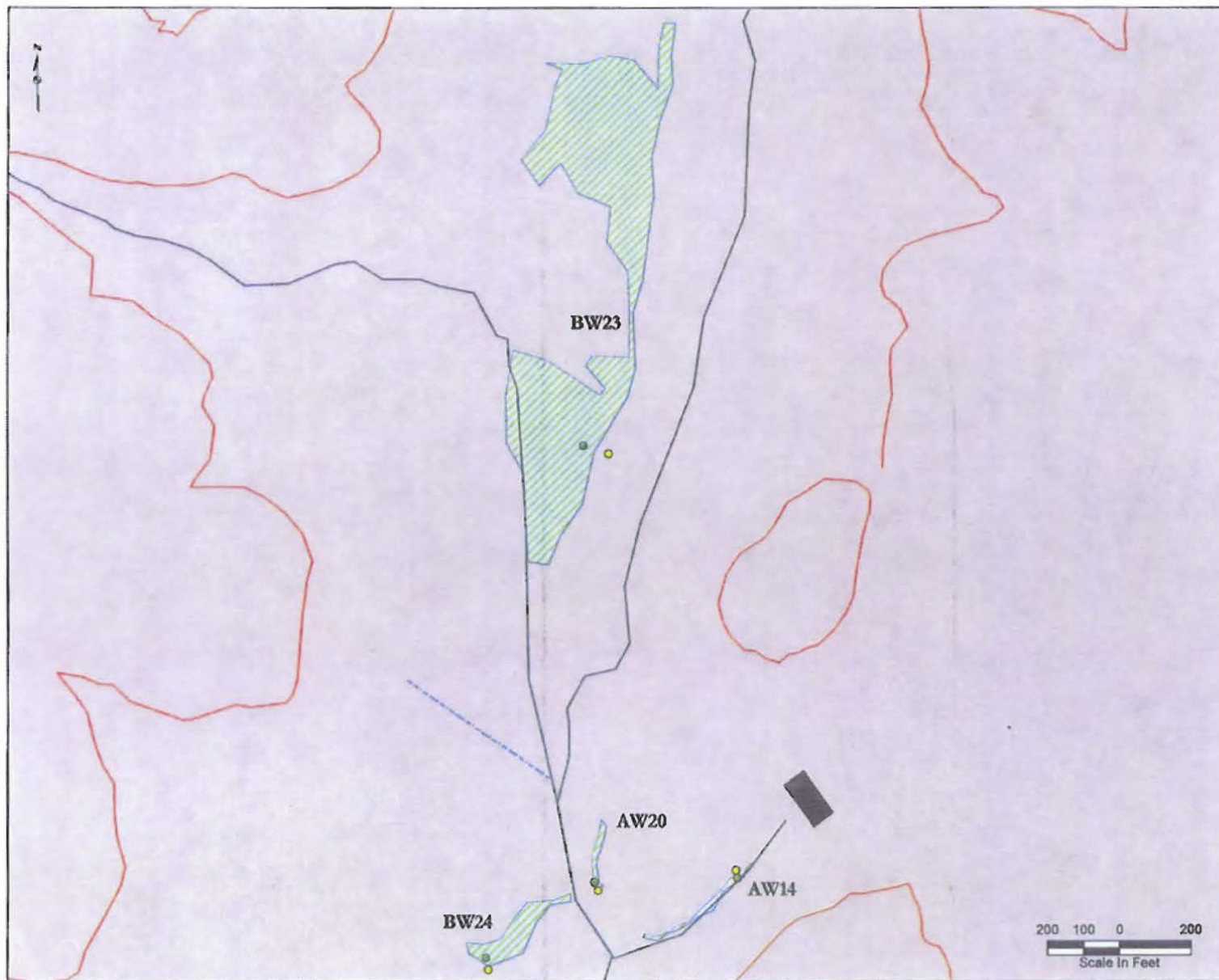
Kleinschmidt Project No. 1051001.01
May 2011

WETLANDS MAP 2 OF 9

JURISDICTIONAL WATERS REPORT
FIGURE 7

HALL COUNTY, GEORGIA

Kleinschmidt
2011 Wetlands & Waters
Scale: 1" = 200'
Project: 1051001.01
Date: 05/09/11
Author: J. Smith
Reviewer: J. Smith



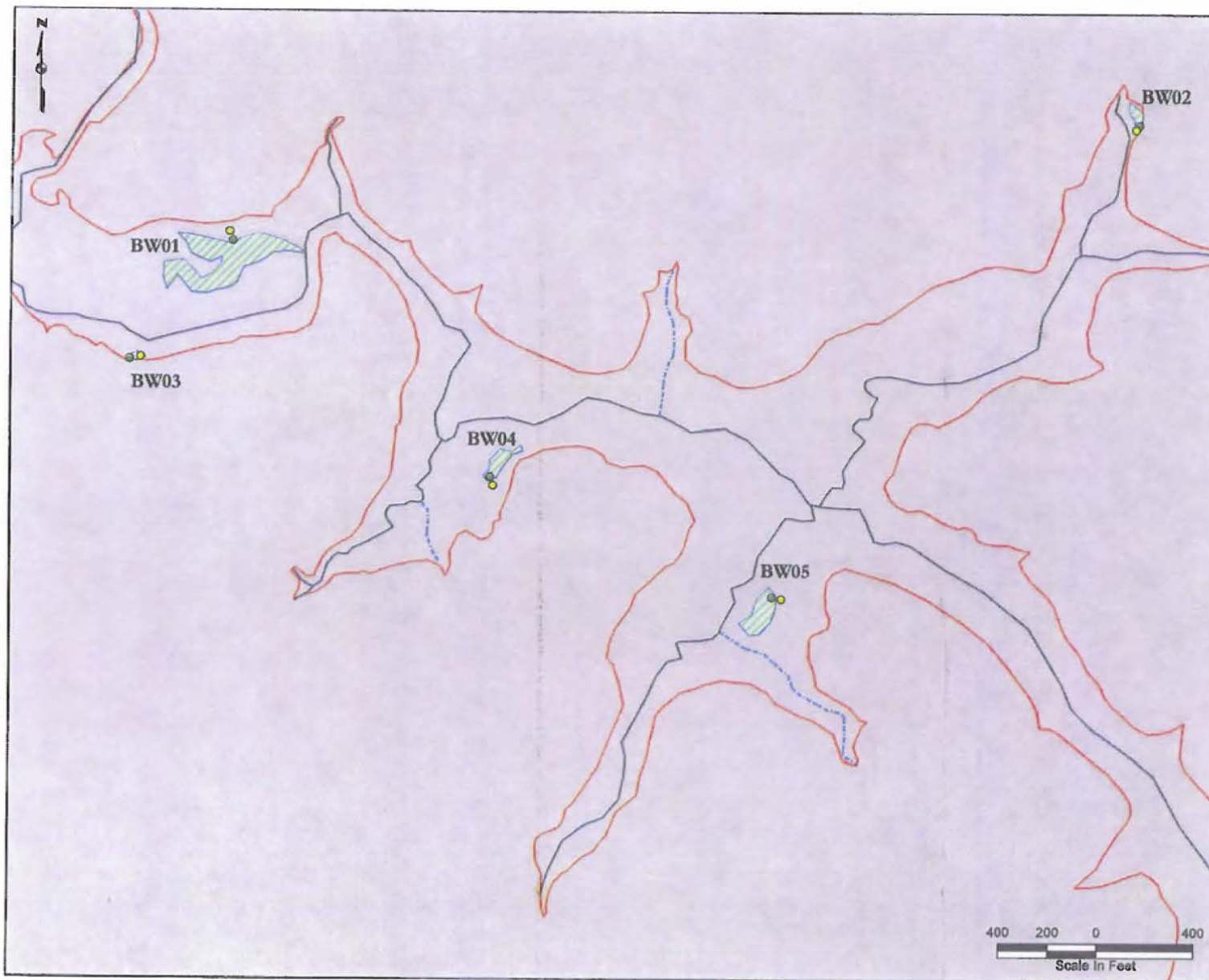
- Paired Data - Upland
- Paired Data - Wetland
- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)
- Location of Proposed Dam

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS AND PAIRED DATA PLOT LOCATIONS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

Kleinschmidt Project No. 1851001.01
May 2011

WETLANDS MAP 3 OF 9
JURISDICTIONAL WATERS REPORT
FIGURE 8

HALL COUNTY, GEORGIA
Kleinschmidt
2014 Compliance Ecoregion
Scale: 1" = 200'
Ecoregion: 2014
Project: 1851001.01
Date: 05/09/2011
www.kleinschmidt.com



- Paired Data - Upland
- Paired Data - Wetland
- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS AND PAIRED DATA PLOT LOCATIONS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

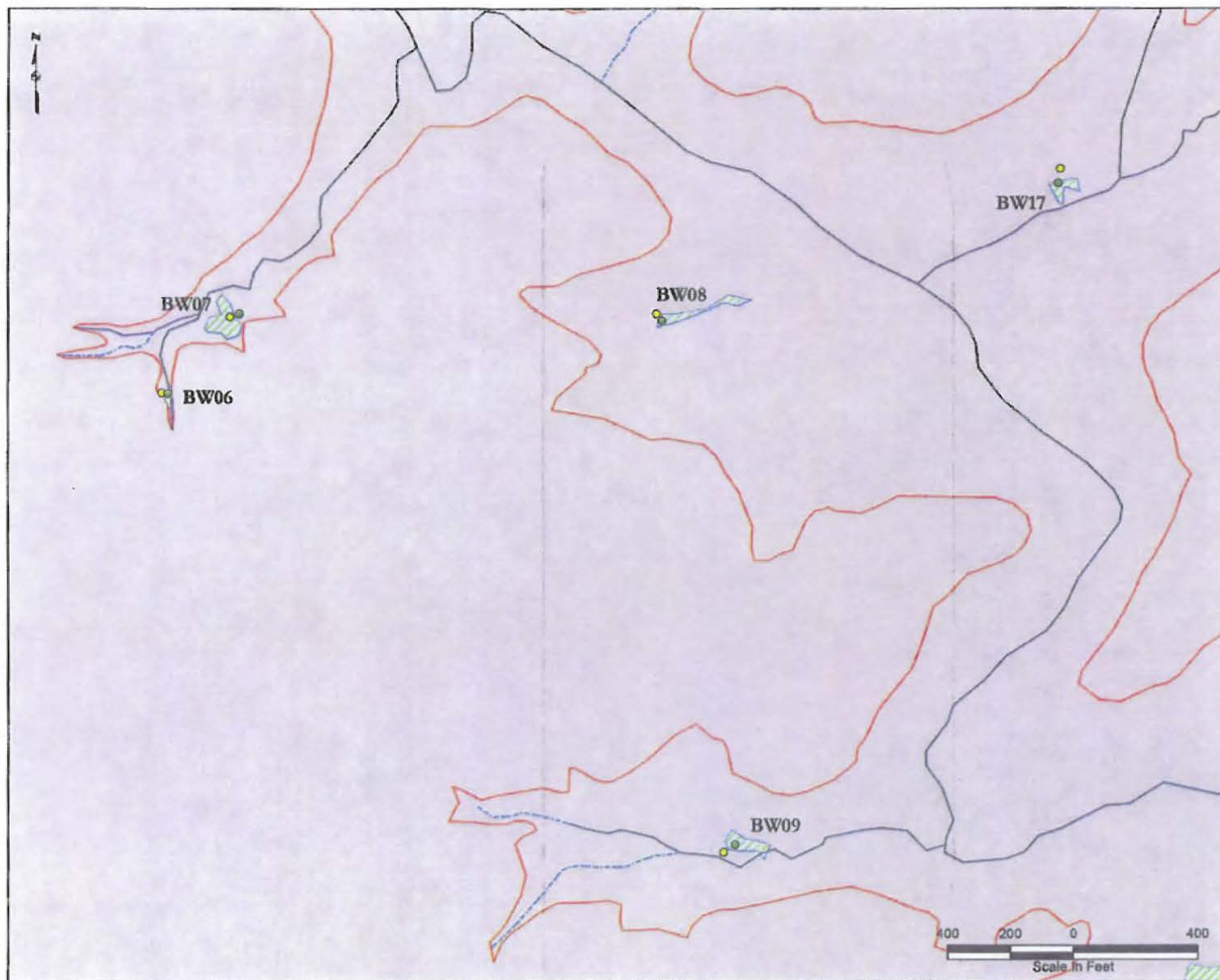
Kleinschmidt Project No. 1851001.01
May 2011

WETLANDS MAP 5 OF 9

JURISDICTIONAL WATERS REPORT
FIGURE 10

HALL COUNTY, GEORGIA

Kleinschmidt
2011 Compliance Form Letter
Form 1001
1-800-444-2422
1111 Highway 4000, Suite 100
Ft. Worth, TX 76103
www.kleinschmidt.com



- Paired Data - Upland
- Paired Data - Wetland
- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS AND PAIRED DATA PLOT LOCATIONS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

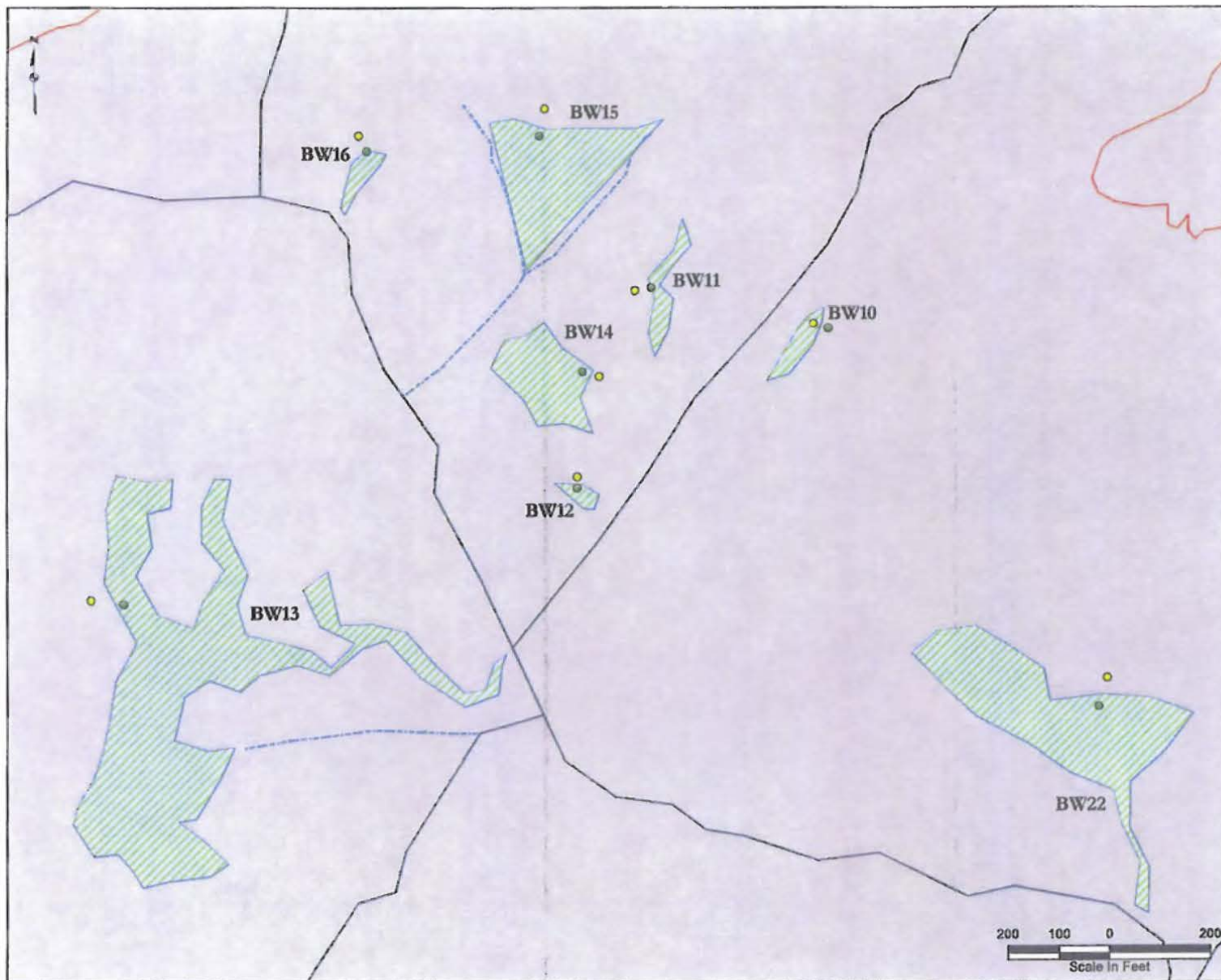
Kleinschmidt Project No. 1851001.01
May 2011

WETLANDS MAP 6 OF 9

JURISDICTIONAL WATERS REPORT
FIGURE 11

HALL COUNTY, GEORGIA

Kleinschmidt
2000 S. Peachtree Dunwoody Road, Suite 100
Atlanta, GA 30328
Phone: 404.581.5000
Fax: 404.581.5001
www.kleinschmidt.com



- Paired Data - Upland
- Paired Data - Wetland
- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS AND PAIRED DATA PLOT LOCATIONS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

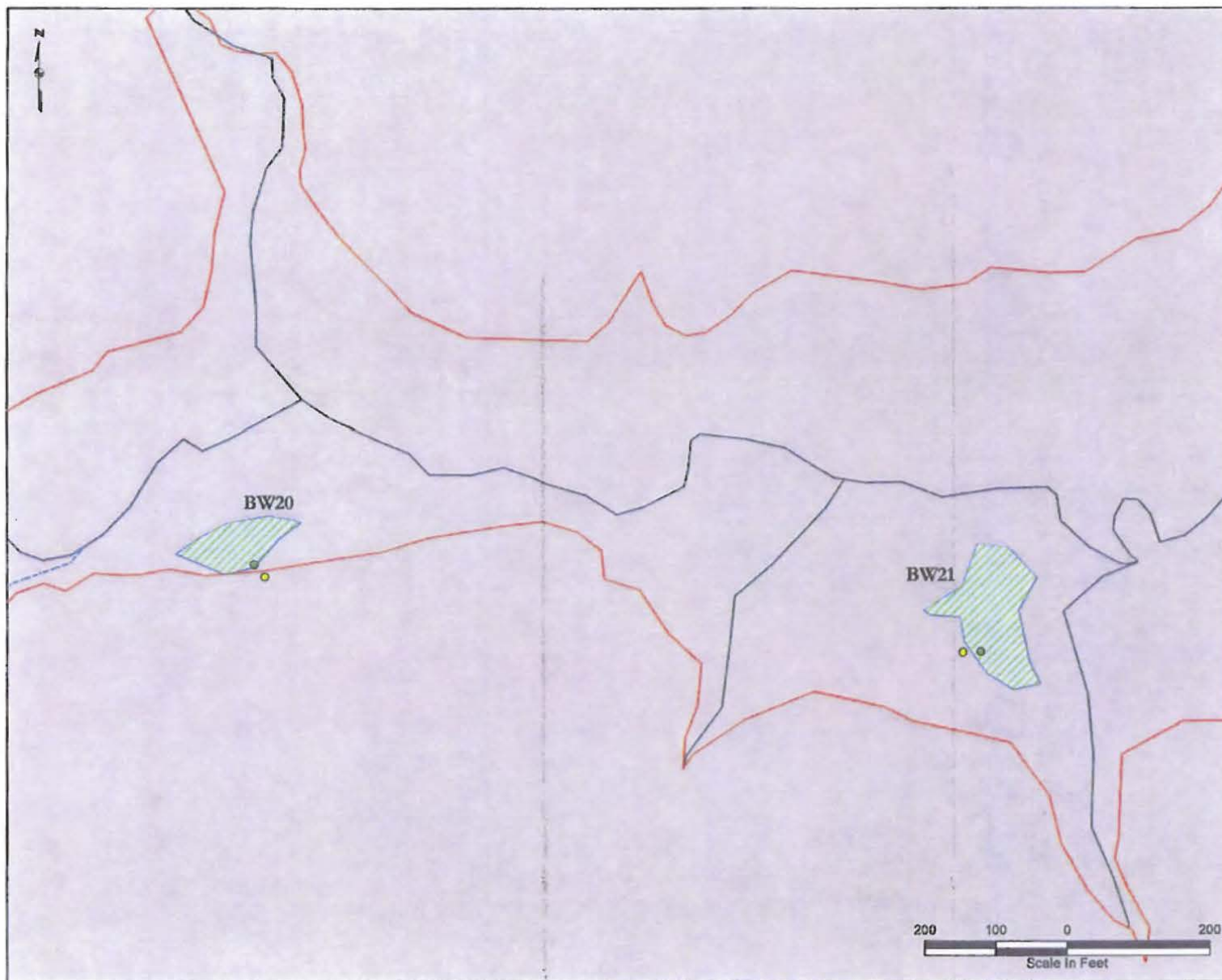
Kleinschmidt Project No. 1051001.01
May 2011

WETLANDS MAP 7 OF 9

JURISDICTIONAL WATERS REPORT
FIGURE 12

HALL COUNTY, GEORGIA

Kleinschmidt
Engineering & Surveying
1000 Peachtree Street, N.E.
Atlanta, Georgia 30309
Phone: 404.525.1000
Fax: 404.525.1001
www.kleinschmidt.com



- Paired Data - Upland
- Paired Data - Wetland
- Wetlands
- Perennial Stream
- Intermittent Stream
- Proposed Normal High Water Elevation (1180 NGVD)

NOTE: EXISTING STREAMS AND PROPOSED NORMAL HIGH WATER ELEVATION (1180 NGVD) PROVIDED BY ECO SOUTH, INC. WETLANDS AND PAIRED DATA PLOT LOCATIONS DELINEATED BY KLEINSCHMIDT ASSOCIATES DURING MAY 2ND - MAY 9TH, 2011.

Kleinschmidt Project No. 1851001.01
May 2011

WETLANDS MAP 9 OF 9

JURISDICTIONAL WATERS REPORT
FIGURE 14

HALL COUNTY, GEORGIA

Kleinschmidt
2011 Survey Report Figure 14
Scale: 1" = 200' (Horizontal)
Scale: 1" = 100' (Vertical)
Project: 1851001.01
Date: 5/9/11



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 WEST OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

JUNE 07 2012

Regulatory Division
SAS-2007-00388

Mr. Tom Oliver
Hall County Board of Commissioners
Post Office Box 1435
Gainesville, Georgia 30503-1435

Dear Mr. Oliver:

I refer to an electronic correspondence dated April 27, 2012, submitted on your behalf by Mr. Jock Connell, requesting a jurisdictional determination for the 850-acre Glades Reservoir project site, located on Flat Creek, west of State Route 365 and the Chattahoochee River (latitude 34.4236, longitude -83.7367). I also refer to inspections of the project site that were facilitated by the US Army Corps of Engineers on March 1, 2012, April 24, 2012, and April 25, 2012, and attended by representatives from AECOM, Rochester and Associates, Hall County, Joe Tanner and Associates, Kleinschmidt Energy and Water Resource Consultants, US Environmental Protection Agency, US Fish and Wildlife Service, and the Georgia Department of Natural Resources. This project has been assigned number SAS-2007-00388 and it is important that you refer to this number in all communication concerning this matter.

We have completed an expanded preliminary Jurisdictional Determination (JD) for the site pursuant to the March 4, 2009, Public Notice entitled, "Characterization of Jurisdictional Determinations: Purpose, Application and Documentation Requirements as Defined by the Savannah District, US Army Corps of Engineers." I have enclosed a "JD Check Sheet" that summarizes the JD, delineation verification and appeals process.

The wetlands/other waters on the subject property may be waters of the United States within the jurisdiction of Section 404 of the Clean Water Act (CWA) (33 United States Code 1344). The placement of dredged or fill material into any waterways and/or their adjacent wetlands or mechanized land clearing of those wetlands would require prior Department of the Army authorization pursuant to Section 404.

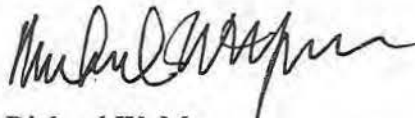
If you intend to sell property that is part of a project that requires Department of the Army Authorization, it may be subject to the Interstate Land Sales Full Disclosure Act. The Property Report required by Housing and Urban Development Regulation must state whether or not a permit for the development has been applied for, issued or denied by the US Army Corps of Engineers (Part 320.3(h) of Title 33 of the Code of Federal Regulations).

This communication does not convey any property rights, either in real estate or material, or any exclusive privileges. It does not authorize any injury to property, invasion of rights, or any infringement of federal, state or local laws, or regulations. It does not obviate your requirement to obtain state or local assent required by law for the development of this property. If the information you have submitted, and on which we have based our determination is later found to be in error, this decision may be revoked.

A copy of this letter is being provided to the following party: Jock Connell, Hall County Board of Commissioners, Post Office Box 1435, Gainesville, Georgia 30503.

Thank you in advance for completing our Customer Survey Form. This can be accomplished by visiting our web site at <http://per2.nwp.usace.army.mil/survey.html> and completing the survey on-line. We value your comments and appreciate your taking the time to complete a survey each time you interact with our office. If you have any questions, please call me at 912-652-5139.

Sincerely,

A handwritten signature in black ink, appearing to read 'Richard W. Morgan', written over a horizontal line.

Richard W. Morgan
Multipurpose Management Branch

Enclosures



DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, US ARMY CORPS OF ENGINEERS
100 WEST OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

REPLY TO
ATTENTION OF:

JURISDICTION DELINEATION CHECK SHEET
USACE FILE NUMBER: SAS-2007-00388
DATE: June 4, 2012

A. SECTION 1 - PRELIMINARY JURISDICTIONAL DETERMINATIONS

1. JURISDICTIONAL DETERMINATION (JD). A "preliminary JD" form was completed for the site in accordance with the March 4, 2009, Public Notice entitled, "Characterization of Jurisdictional Determinations: Purpose, Application and Documentation Requirements as Defined by the Savannah District, US Army Corps of Engineers." The form details whether streams, wetlands and/or other waters present on the site may be subject to the jurisdiction of the US Army Corps of Engineers (USACE). In summary, the USACE has determined the following with regard to waters present on the site:

_____ There may be navigable waters of the United States (US) within Rivers and Harbors Act (RHA) jurisdiction present.

_____ There may be waters of the US within Clean Water Act (CWA) jurisdiction present.

2. DELINEATION VERIFICATION. With regard to the location and extent of potentially jurisdictional areas present on the site, the USACE has made the following determinations:

_____ Wetlands were delineated in accordance with criteria contained in the 1987 "Corps of Engineers Wetland Delineation Manual," as amended by the most recent regional supplements to the manual.

_____ Drawings submitted with a Pre-Construction Notification (or other application) depict the approximate location/boundaries of all potentially jurisdictional waters on the project site. The USACE has verified the accuracy of the depicted boundaries of potentially jurisdictional waters in only the immediate vicinity of waters to be impacted. A complete jurisdictional delineation request, including a jurisdictional waters survey, would be required in order for the USACE to consider final verification of all other jurisdictional boundaries on the project site.

_____ The drawing entitled "_____" dated _____ is an acceptable sketch of the approximate location/boundaries of all the potentially jurisdictional waters in the project area. This sketch can be used for initial real estate planning; projects with temporary impacts to waters; projects involving minor amounts of fill in waters; or work only subject to our jurisdiction pursuant to Section 10 of the Rivers and Harbors Act of 1899. A complete jurisdictional delineation request, including a jurisdictional waters survey, would be required in order for the USACE to consider final verification of all other jurisdictional boundaries on the project site.

3. APPEALS OF PRELIMINARY JURISDICTIONAL DETERMINATIONS: The preliminary JD is a "non-binding" written indication that there may be waters of the US on a parcel. Preliminary JDs are advisory in nature and may not be appealed (See 33 CFR 331.2). If you are not in agreement with this preliminary JD, then you may request an approved jurisdictional determination for your project site or review area.

B. SECTION - EXPANDED PRELIMINARY JURISDICTIONAL DETERMINATIONS:

1. JURISDICTIONAL DETERMINATION (JD). An "expanded preliminary JD" form was completed for the site in accordance with the March 4, 2009, Public Notice entitled, "Characterization of Jurisdictional Determinations: Purpose, Application and Documentation Requirements as Defined by the Savannah District, US Army Corps of Engineers." The form details whether streams, wetlands and/or other waters present on the site may be subject to the jurisdiction of the USACE. In summary, the USACE has determined the following with regard to waters present on the site:

 There may be navigable waters of the United States (US) within Rivers and Harbors Act (RHA) jurisdiction present.

 X There may be waters of the US within Clean Water Act (CWA) jurisdiction present.

2. DELINEATION VERIFICATION. With regard to the location and extent of potentially jurisdictional areas present on the site, the USACE has made the following determinations:

 X Wetlands were delineated in accordance with criteria contained in the 1987 "Corps of Engineers Wetland Delineation Manual," as amended by the most recent regional supplements to the manual.

 X The Global Positioning System (GPS) delineation entitled "Jurisdictional Waters Report, Figures 5-14", dated May 2011, is an accurate delineation of the location/boundaries of all the potentially jurisdictional waters on the site. If you have not already done so, I recommend that you place a statement on this delineation to the effect that, **"WETLANDS AND OTHER WATERS SHOWN ON THIS DRAWING ARE POTENTIALLY UNDER THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS AS SHOWN IN USACE FILE NUMBER SAS-2007-00388. OWNERS MAY BE SUBJECT TO PENALTY BY LAW FOR DISTURBANCE TO THESE WATERS WITHOUT PROPER AUTHORIZATION."** This delineation will remain valid for a period of 5 years unless new information warrants revision prior to that date.

 The survey entitled " ", dated , and signed by Registered Land Surveyor , is an accurate delineation of the location/boundaries of all the potentially jurisdictional waters on the site. If you have not already done so, I recommend that you place a statement on the final surveyed property plat to the effect

that, "WETLANDS AND OTHER WATERS SHOWN ON THIS DRAWING ARE POTENTIALLY UNDER THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS AS SHOWN IN USACE FILE NUMBER SAS-2007-00388. OWNERS MAY BE SUBJECT TO PENALTY BY LAW FOR DISTURBANCE TO THESE WATERS WITHOUT PROPER AUTHORIZATION." This delineation will remain valid for a period of 5-years unless new information warrants revision prior to that date.

3. APPEALS OF PRELIMINARY JURISDICTIONAL DETERMINATIONS: The expanded preliminary JD is a "non-binding" written indication that there may be waters of the US on a parcel. Expanded Preliminary JDs are advisory in nature and may not be appealed (See 33 CFR. 331.2)." If you are not in agreement with this expanded Preliminary JD, then you may request an approved jurisdictional determination for your project site or review area.

C. SECTION 3 - APPROVED DETERMINATIONS: As defined in Regulatory Guidance Letter 08-02, an approved JD is an official Savannah District determination that jurisdictional "waters of the United States" or "navigable waters of the United States," or both, are either present or absent on a particular site. An approved JD precisely identifies the limits of those waters on the project site determined to be jurisdictional under the Clean Water Act (CWA) and/or the Rivers and Harbors Act (RHA).

1. JURISDICTIONAL DETERMINATION (JD). An "approved JD" form was completed for the site pursuant to the June 5, 2007, "US Army Corps of Engineers (USACE) JD Form Instructional Guidebook." The form details whether streams, wetlands and/or other waters present on the site are subject to the jurisdiction of the USACE. In summary, the USACE has determined the following with regard to waters present on the site:

_____ There are navigable waters of the (US) within (RHA) jurisdiction present.

_____ There are waters of the US within (CWA) jurisdiction present.

_____ There are non-jurisdictional waters of the US located in the project area.

_____ There are no jurisdictional waters of the US located in the project area.

2. APPROVED DETERMINATION - ISOLATED, NON-JURISDICTIONAL WATERS. If Appendix E of the March 4, 2009, Public Notice entitled, "Characterization of Jurisdictional Determinations: Purpose, Application and Documentation Requirements as Defined by the Savannah District, US Army Corps of Engineers" was submitted, you have requested that the USACE verify the presence of isolated, non-jurisdictional waters located at the project site or within the review area. The completed Appendix E form is available at <https://sasweb.sas.usace.army.mil/JD/>, under the above listed file number. You may also request that a printed copy of the form be mailed to you. This isolated, non-jurisdictional determination will remain valid for a period of 5-years unless new information warrants revision prior to that

date. In summary, the USACE has determined the following with regard to isolated, non-jurisdictional waters that are present on the site:

_____ Wetlands were delineated in accordance with criteria contained in the 1987 "Corps of Engineers Wetland Delineation Manual," as amended by the most recent regional supplements to the manual.

_____ There are isolated non-jurisdictional waters present that are not subject to CWA jurisdiction. Specifically, wetland(s) [letter of wetlands here], as identified on the exhibit entitled "_____" is/are isolated, non-jurisdictional wetlands. Department of the Army authorization, pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344), is not required for dredge and/or fill activities in these areas.

3. APPROVED DETERMINATION. (other than isolated, non-jurisdictional waters): If Appendix B of the March 4, 2009, Public Notice entitled, "Characterization of Jurisdictional Determinations: Purpose, Application and Documentation Requirements as Defined by the Savannah District, US Army Corps of Engineers" was submitted, you have requested that the USACE verify the presence of jurisdictional waters located at the project site or within the review area. The completed Appendix B form is available at <https://sasweb.sas.usace.army.mil/JD/>, under the above listed file number. You may also request that a printed copy of the form be mailed to you. This jurisdictional determination will remain valid for a period of 5-years unless new information warrants revision prior to that date. In summary, the USACE has determined the following with regard to isolated, non-jurisdictional waters that are present on the site:

_____ Wetlands were delineated in accordance with criteria contained in the 1987 "Corps of Engineers Wetland Delineation Manual," as amended by the most recent regional supplements to the manual.

_____ The Global Positioning System (GPS) delineation entitled "_____", dated _____, is an accurate delineation of all the jurisdictional boundaries on the site. If you have not already done so, I recommend that you place a statement on this delineation to the effect that, **"JURISDICTIONAL WETLANDS AND OTHER WATERS SHOWN ON THIS DRAWING ARE UNDER THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS AS SHOWN IN USACE FILE NUMBER SAS-2007-00388. OWNERS MAY BE SUBJECT TO PENALTY BY LAW FOR DISTURBANCE TO THESE JURISDICTIONAL AREAS WITHOUT PROPER AUTHORIZATION."** This approved jurisdictional determination will remain valid for a period of 5-years unless new information warrants revision prior to that date.

_____ The survey entitled "_____", dated _____, and signed by Registered Land Surveyor _____, is an accurate delineation of all the jurisdictional boundaries on the site. If you have not already done so, I recommend that you

place a statement on the final surveyed property plat to the effect that, "**JURISDICTIONAL WETLANDS AND OTHER WATERS SHOWN ON THIS DRAWING ARE UNDER THE JURISDICTION OF THE US ARMY CORPS OF ENGINEERS AS SHOWN IN USACE FILE NUMBER SAS-2007-00388. OWNERS MAY BE SUBJECT TO PENALTY BY LAW FOR DISTURBANCE TO THESE JURISDICTIONAL AREAS WITHOUT PROPER AUTHORIZATION.**" This approved jurisdictional determination will remain valid for a period of 5-years unless new information warrants revision prior to that date.

4. APPEALS FOR APPROVED JURISDICTIONAL DETERMINATIONS: You may request an administrative appeal for any approved geographic jurisdictional determination under USACE regulations at 33 Code of Federal Regulation (CFR) Part 331. Enclosed you will find a Notification of Administrative Appeal Options and Process and Request for Appeal (RFA) Form.

If you request to appeal this/these determination(s) you must submit a completed RFA form to the South Atlantic Division Office at the following address:

US Army Corps of Engineers, South Atlantic Division
Attention: CESAD-PDS-O, Administrative Appeal Review Officer
60 Forsyth Street, Room 10M15
Atlanta, Georgia 30303-8801

In order for a RFA to be accepted by the USACE, the USACE must determine that it is complete, that it meets the criteria for appeal under 33 CFR, part 331.5, and that it has been received by the Division Office within 60 days of the date of this form. It is not necessary to submit an RFA form to the Division Office if you do not object to this jurisdictional determination.

D. SECTION 4 - APPLIES TO ALL OF THE ABOVE.

- US DEPARTMENT OF AGRICULTURE (USDA) PROGRAM PARTICIPANTS.

This delineation/determination has been conducted to identify the limits of USACE CWA jurisdiction for this site. This delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985, as amended. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service prior to starting work.

Attachments:


☐ Verified Survey of Jurisdictional Streams, Wetlands and/or Other Waters

☒ Verified GPS Delineation of Jurisdictional Streams, Wetlands and/or Other Waters

_____ Drawing of Approximate Location of Streams, Wetlands and/or Other Waters

_____ Approved Jurisdictional Determination Form(s)

 X Notification of Administrative Appeal Options and Process and Request for Appeal Form



Richard W. Morgan
Multipurpose Management Branch

7 June 2012
DATE

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Tom Oliver File Number: SAS-2007-00388 Date: June 4, 2012

Attached is: See Section below

<input type="checkbox"/>	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
<input type="checkbox"/>	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
<input type="checkbox"/>	PERMIT DENIAL	C
<input type="checkbox"/>	APPROVED JURISDICTIONAL DETERMINATION	D
<input checked="" type="checkbox"/>	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at <http://www.usace.army.mil/inet/functions/cw/cecwo/reg> or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit.

ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. The division engineer must receive this form within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:

Richard Morgan
US Army Corps of Engineers, Savannah District
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640
912-652-5139

If you only have questions regarding the appeal process you may also contact:

Administrative Appeal Review Officer
CESAD-PDS-O
US Army Corps of Engineers, South Atlantic Division
60 Forsyth Street, Room 10M15
Atlanta, Georgia 30303-8801

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15-day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent.

Date:

Telephone number:

BAT SURVEY REPORT

Myotis sodalis

Indiana Bat

Myotis septentrionalis

Northern Long-eared Bat

Glades Water Supply Reservoir, Pump Station, & Raw Water Pipelines

Hall County Board of Commissioners

Hall County, Georgia

August 2015

Prepared by:

Eco-Tech Consultants, Inc.

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Prepared for:

Hall County Public Works Department

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Gainesville, GA 30504

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Principal Researcher:



Peter Lee Droppelman
Principal Scientist

Executive Summary

The Hall County Board of Commissioners (County), proposes to construct a 3.43 square-kilometer (850-acre) public drinking water supply reservoir at 1,180 feet mean sea level (msl) on Flat Creek in northern Hall County, Georgia. The project is located approximately 2.5 miles southeast of the town of Clermont, Georgia.

A desktop review of habitat types conducted by Eco-Tech Consultants, Inc. (Eco-Tech) found that the 2,279-acre study area, consisting of the proposed normal pool and dam site, was <1% non-forested wetland, <1% open water, 1% forested wetland, 3% clearcut forest, 5% urban residential, 9% mixed forest, 18% evergreen forest, and 25% pasture. Approximately 38% of the study area was hardwood forest and provided the most suitable habitat for bats. The field summer habitat assessment, conducted by Eco-Tech on June 9, 2015, found these wooded areas suitable for the federally endangered Indiana bat (*Myotis sodalis*) and the federally threatened northern long-eared bat (*M. septentrionalis*) roosting and foraging. The dominant species within this habitat were white oak (*Quercus alba*), loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), black cherry (*Prunus serotina*), tulip poplar (*Liriodendron tulipifera*) and pignut hickory (*Carya glabra*). Existing forested habitat and streams within the project study area may provide suitable foraging and/or flying corridors for Indiana bats and northern long-eared bats.

Eco-Tech Consultants, Inc. conducted mist netting and acoustic surveys June 13-June 23, 2015. Eight sites were surveyed within the study area using mist netting and nearby acoustic detectors. Seventy-two bats from three species were captured. Acoustic analyses using EchoClass software identified 10 species potentially present in the area including the Indiana bat, northern long-eared bat, and the federally endangered gray bat (*Myotis grisescens*). Manual analysis concurred that six suspected *Myotis* spp. call sequences were likely produced by bat species in the genus *Myotis*, but species level classifications could not be verified.

No federally listed species were captured during the survey however, suspected calls of the federally listed Indiana bat, federally listed gray bat, and federally listed northern long-eared bat were recorded with ultrasonic bat detectors, although species-level classifications of these species could not be determined by manual analysis. Existing forest within the study area were comprised of suitable roosting and foraging habitat for Indiana bats and northern long-eared bats. There are no suggested clearing restrictions for forested habitat or other conservation measures aimed specifically to benefit the Indiana bat or the northern long-eared bat.

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APPENDICES

- Appendix A: Habitat Assessment
- Appendix B: Approved Study Plan and USFWS Correspondence
- Appendix C: Field Data Forms
- Appendix D: Comprehensive Bat Capture Table
- Appendix E: Representative Acoustic Sonograms
- Appendix F: References

A. Project Description

Eco-Tech Consultants (Eco-Tech) has been contracted by the Hall County Board of Commissioners (County) to conduct compliance surveys for the proposed construction of a public drinking water supply reservoir along Flat Creek, pump station at the Chattahoochee River, and raw water pipeline in northern Hall County, Georgia (Figure 1). The proposed reservoir is within the anticipated range of the federally endangered Indiana bat (*Myotis sodalis*) (Figure 2), and the known range of the northern long-eared bat (*Myotis septentrionalis*) (Figure 3), a species recently ruled as threatened under the Endangered Species Act (ESA), effective May 4, 2015 (USFWS 2015a).

The County plans to construct a 3.43 square-kilometer (850-acre) public drinking water supply reservoir at 1,180 feet mean sea level (msl) on Flat Creek in northern Hall County, Georgia. The proposed reservoir will yield a maximum of 72.5 million gallons of water a day when supplemented from raw water delivered from the Chattahoochee River through a proposed, 6.7-kilometer (4.2 mile) pipeline. Project implementation would include the construction of a 0.02 square-kilometer (5-acre) pump station building apron located adjacent to the Chattahoochee River approximately 5 miles upstream of Flat Creek.

B. Qualifying Statement

The scientists of Eco-Tech Consultants have surveyed for federally protected plants and animals across the nation, resulting in distribution records and life history information for many investigated species. Eco-Tech holds scientific collection permits for over 50 federally listed species in more than 20 states, including bats and other small mammals, freshwater mussels, fish, and plants. For bats, specifically, Eco-Tech has conducted species surveys from California to New Jersey using a host of survey techniques, including mist nets, harp traps, passive/active acoustic monitoring, infrared/thermal video recording, aerial/ground telemetry, and technical caving searches. Eco-Tech has worked with numerous organizations to develop scientifically-sound survey plans, biological assessments, protection and enhancement plans, and mitigation strategies.

The principal investigator for this project is Mr. Lee Droppelman. Mr. Droppelman has led and actively participated in bat surveys across the U.S. since 1998. He holds a federal collection permit (TE810274-11, GA# 29-WJH-13-145) for all eastern bats and over 50 other listed species throughout their ranges. Mr. Droppelman directs all agency formal consultations and is proficient in the determination of effects and development of cost-effective minimization, avoidance, and mitigation measures to offset potential project impacts.

Additionally, Eco-Tech has a qualified and extensive staff of federally permitted biologists. This scientific staff includes published authors, MS and PhD bat biologists, and trained Section 7 consultants with experience ranging from four to 25 years.

C. Study Area

The reservoir normal pool, constructed dam footprint, pump station apron, and a 0.5-kilometer buffer around the proposed pipeline alignment made up the 2,279-acre study area. Approximately 714 acres of forest clearing are proposed within the study area. The proposed pump station apron lies within the linear study area buffer and thus did not warrant an additional non-linear survey site. The study area primarily consisted of woodlands having mid-canopy and understory of medium density and hay pastures.

The study area was located entirely within the Southern Inner Piedmont (45a) Level IV Ecoregion as mapped by Griffith et al. (2001). This ecoregion is comprised of rolling to hilly areas where mica schist and micaceous saprolite are common. The ecoregion is now mostly forested, with major forest types of oak-pine and oak-hickory. Open areas are mostly pasture with hay, cattle and poultry being the main agricultural products. In the last twenty years the urban/suburban land cover has increased greatly within this ecoregion.

A desktop review of habitat types conducted by Eco-Tech Consultants, Inc. (Eco-Tech) found that the 2,279-acre study area, consisting of the proposed normal pool and dam site, was <1% non-forested wetland, <1% open water, 1% forested wetland, 3% clearcut forest, 5% urban residential, 9% mixed forest, 18% evergreen forest, 25% pasture, and 38% deciduous hardwood forest.

D. Species Description and Life History

Myotis sodalis Miller & Allen, 1928 (Indiana bat)

Species Status

The Indiana bat is a temperate, insectivorous, migratory bat that hibernates in caves and abandoned mines during winter and spends the summer season in forested areas. It was listed as an endangered species on March 11, 1967, by the United States Fish and Wildlife Service (USFWS 1967). However, the Indiana bat did not receive formal protection until enactment of the Endangered Species Act in 1973 (Public Law 93-205), as amended. Critical habitat for the species was designated on September 24, 1976; it consists of 11 caves and two mines in six states.

Several years following its listing, an Indiana bat recovery plan was developed by biologists (i.e., the recovery team), which outlines habitat requirements, critical habitat, potential causes for declines, and recovery objectives. The most current draft recovery plan was issued in 2007 and represents the most up-to-date regulatory account of the species (USFWS 2007).

Indiana bat estimated population numbers consistently declined from 1965 to 2001. This steady overall decline can be attributed to several causes including:

- human modifications to hibernacula and surrounding areas,
- disturbance and vandalism of hibernacula,
- natural catastrophes,
- disturbance of summer habitat, and
- disturbance of migration pathways including loss and degradation of forested habitat (USFWS 2007).

However, estimates of range wide Indiana bat population totals from surveys conducted post-2001 actually increased. In 2007, a 23% population increase over a 2001 survey was found, yielding an approximate total of 467,947 Indiana bats (USFWS 2007). The large increase was likely due to increases in the local populations at 34 known high-priority hibernacula (USFWS 2007). Since then, however, white-nose syndrome (WNS), an affliction resulting in torpor disturbance from the fungus *Pseudogymnoascus destructans* (Minnis and Lindner 2013), has emerged as a new and severe threat to Indiana bats and all cave-dwelling bats (USFWS 2015c).

Description

Indiana bats are best identified by a distinctively keeled calcar, toe hairs that do not extend past the toe nails, a pinkish nose, and blunt tragus compared to other species in the genus *Myotis* (Brack et al. 2010). The fur is short, grayish, and typically duller than other *Myotis* species. Fur on the venter is lighter than the dorsum, but does not contrast as strongly as with other *Myotis* species. Dorsal fur is darker at the base than the tip. Forearm length is 35 to 41 millimeters, and weight is 5 to 10 grams. Indiana bats are most often confused with little brown bats (*M. lucifugus*). The best way to distinguish these species is from the presence of a strongly keeled calcar in Indiana bats versus an unkeeled calcar in little brown bats, and toe hairs that do not extend past the toe nails in Indiana bats versus toe hairs that do extend past the toe nails in little brown bats (Barbour and Davis 1969).

Distribution/Abundance

The Indiana bat's range includes most of the eastern United States. It is known to historically occur from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida (Barbour and Davis 1969, Gardner and Cook 2002). The species' core range is generally consistent with the presence of limestone caves that serve as hibernacula in the winter (Menzel et al. 2001).

According to the USFWS (2007) winter survey results from 2005, over 90% of the total Indiana bat population hibernates in only five states: Indiana, Missouri, Kentucky, Illinois, and New York.

Indiana bats are known to migrate up to 360 miles from their hibernacula to find suitable summer habitat to raise offspring (Kurta and Murray 2002, Winhold and Kurta 2006). Reproductive Indiana bats have now been documented in many states across the eastern United States, including Georgia (USFWS 2007).

In Georgia, Indiana bats have been found sporadically overwintering in caves in Dade and Chattooga counties (Menzel et al. 2001). In 2012, a maternity colony was discovered on Rich Mountain (Figure 2a) in Gilmer County, after a springtime migration study successfully tracked a single female bat from White County, Tennessee (GDNR 2012).

Ecology

Prior to entering hibernacula in autumn, swarming occurs at or near the entrances of the hibernacula (Cope and Humphrey 1977, LaVal et al. 1977). Swarming usually lasts for several weeks in August and September, with mating occurring towards the end of this period. After the mating period, females will usually fly directly to their hibernacula to begin hibernation, whereas males may remain active through the end of November prior to beginning hibernation. Reproductive females store sperm through the winter, delaying fertilization until early May. During April and May, the majority of the Indiana bat population emerges from their hibernacula to find suitable summer habitat. However, some male and non-reproductive female Indiana bats will remain near hibernacula during the summer. Females usually start grouping into larger nursery colonies by mid-May and give birth to a single pup between late-June and early-July (Easterla and Watkins 1969, Humphrey et al. 1977).

Indiana bats forage primarily in forested habitats (Cope et al. 1974, Humphrey et al. 1977, LaVal et al. 1977, Belwood 1979), but they will also forage in edges of forests and croplands, fallow fields, and areas of impounded water (Gardner et al. 1991a). Indiana bats may use as many as four different foraging areas during nightly foraging (Murray 1998), using the same travel corridor each night to move from the roost tree to the foraging areas. It has been documented that Indiana bats may travel up to three miles from their summer roosts to summer foraging areas and will visit these same areas each night. Reproductively active females traveled a maximum mean distance of 1.5 miles from their roost trees to foraging areas in Illinois (Gardner et al. 1991a). During a study by Pruitt et al. (1995) at the Jefferson Proving Ground, Jefferson County, Indiana, reproductive female bats were found to travel a mean distance of 1.7 miles from their original capture sites to their roost trees.

Indiana bats prey primarily on caddisflies (Trichoptera), moths (Lepidoptera), beetles (Coleoptera), and true flies (Diptera; Belwood 1979, Brack 1983, Brack and LaVal 1985, Kiser and

Elliot 1996). Kurta and Whitaker (1998) found that Indiana bats in Michigan consumed primarily Trichoptera (55.1%) and Diptera (25.5%), likely due to the large availability of such insects in close proximity to watercourses and waterbodies where Indiana bats tend to feed.

Habitat Requirements

Selection of roost trees by Indiana bat colonies are based on structural and situational characteristics. Tree diameter, solar exposure, and height in canopy are among the most important (Romme et al. 1995, Kurta and Murray 2002). Male and female Indiana bats have different habitat preferences for roost tree selection (Kurta 2005). Reproductive females tend to choose roosts in mature forests with large trees, scattered gaps in the canopy, and an open understory (Gardner et al. 1991b, Callahan et al. 1997). The number of available roost trees in an area influences the suitability of habitat for female Indiana bats (Kurta 2005). Gardner et al. (1991b) found that of 39 roost trees evaluated, 31% were not suitable the following summer, and that 33% of the remaining trees were unavailable for use after two summers. Thus, roost trees are an ephemeral resource.

Maternity colonies have been found under sloughing bark of dead, partially dead, and live trees (Carter 2003, Gardner et al. 1991b, Kurta et al. 1993, Kurta et al. 2002, Romme et al. 1995). Maternity roosts can contain over 350 individual bats during July and August (Kiser et al. 1998). Indiana bats require more than one roost tree to fulfill their needs during the summer (Callahan et al. 1997). Barclay and Kurta (2004) found one maternity colony that used 18 roost trees during a single summer. In addition, Indiana bats are known to roost in several different species of trees, selecting roost trees by the structural composition of each tree. More than 30 tree species have been found to be roosts for reproductive female Indiana bats, and most have been found to be ashes (*Fraxinus* spp.), elms (*Ulmus* spp.), hickories (*Carya* spp.), maples (*Acer* spp.), eastern cottonwood (*Populus deltoides*), and oaks (*Quercus* spp.) (USFWS 2007). It appears that tree species use is more closely related to local availability and suitable structure than to broad regional preferences (USFWS 2007). Farmer et al. (1997) contends that structure is probably more important than tree species in selection of roost trees.

Approximately 97% of female Indiana bat roost trees at maternity sites are deciduous species (Harvey 2002, Britzke et al. 2003). In the far southern portion of the Indiana bat range, dead pine stands killed by southern pine beetles (*Dendroctonus frontalis*) have been recorded as maternity roosts. This more likely reflects availability and structural preference rather than a preference for coniferous tree species (USFWS 2007).

Indiana bats have occasionally been observed using bridges as roosting structures or maternity colony roosting sites (Mumford and Cope 1958, Kiser et al. 2002, Keeley and Tuttle 1999, Barbour and Davis 1969). However, the overall suitability of bridges as roosting structures for this species is not well documented and bridges are not considered to be a typical roosting source.

Indiana bats hibernate primarily in caves, but they have also been documented using abandoned mines. As of November 2006, the USFWS (2007) has winter records of 281 distinct hibernacula in 19 states that have been occupied continually since 1995.

Myotis septentrionalis (Trouessart, 1897) (northern long-eared bat)

Species Status

In 2010 the Center for Biological Diversity (CBD) petitioned the USFWS to list the northern long-eared bat as threatened or endangered under the Endangered Species Act (CBD 2010). USFWS concluded a 12-month finding on the status of the northern long-eared bat and on October 2, 2013, USFWS published its finding that protection is warranted under the Endangered Species Act. The northern long-eared bat was listed as a federally threatened species on May 4, 2015, by the USFWS (USFWS 2015a); affording it protection under the Endangered Species Act of 1973 (Public Law 93-205), as amended.

The status of northern long-eared bat populations is difficult to characterize due to the fact that they have a large geographic range, yet tend to hibernate in colonies smaller than 100 individuals (Barbour and Davis 1969, Caire et al. 1989). Their sparse distribution prevents biologists from counting a large percentage of the population at relatively few caves, as is possible with Indiana bats and federally endangered gray bats (*Myotis grisescens*). However, as part of the 12-month finding on the CBD petition, it was determined that several threats have caused and will continue to cause dramatic declines in the range-wide population of the northern long-eared bat (USFWS 2013). The status review and subsequent listing identified that the primary threat to the northern long-eared bat is WNS. The disease has led to dramatic and rapid population declines in northern long-eared bats of up to 99 percent from pre-WNS levels in some areas (USFWS 2013).

Other sources of mortality to the species include:

- wind-energy development,
- habitat modification, destruction and disturbance (*e.g.*, vandalism to hibernacula, roost tree removal),
- effects of climate change, and
- contaminants.

Although no significant decline has been observed due to these factors, they may have cumulative effects to the species in addition to WNS (USFWS 2013).

Description

The northern long-eared bat typically weighs 5 to 10 grams with an average forearm length of 35 millimeters. Body length is approximately 95 millimeters (Caceres and Barclay 2000). While the

northern long-eared bat appears superficially similar to other *Myotis* species, such as the little brown bat and the Indiana bat, the ears of the northern long-eared bat are extremely large for an eastern *Myotis* species and the tragus is very symmetrically thin and pointed (tragus >9 millimeters in length and ear >17 millimeters in length). This species is similar in color to the little brown bat; dorsal pelage is a dullish yellow-brown with brown shoulder spots, and ventral pelage is pale gray. Females tend to be slightly larger and heavier than males (Caceres and Pybus 1997).

Distribution/Abundance

The northern long-eared bat ranges widely across much of Canada and the U.S., but is patchily distributed and rarely found in large numbers (Barbour and Davis 1969). It is more common in the northern part of its range than in the southern portion (Harvey 1992), and relatively rare in the northwestern part of its range (Caceres and Barclay 2000). It occurs in all Canadian provinces, in the Yukon and Northwest Territories, and in eastern, midwestern, and some southern states (e.g., Crnkovic 2003). A small number of sightings have also been reported in Montana and Wyoming (Schmidt 2001).

In Georgia, this species is found in the Blue Ridge, Ridge and Valley, Cumberland Plateau, and Piedmont provinces. (Figure 2b). Sporadic records are present in southern Georgia and the panhandle of Florida (Menzel et al. 2001), but the northern long-eared bat was reported as relatively common in northern Georgia prior to the onset of WNS (Menzel et al. 2001).

Ecology

Reproductively active females produce a single offspring each year (Caceres and Barclay 2000). Juvenile mortality is high, as pups are highly vulnerable at birth and may have difficulty accumulating adequate energy reserves before the hibernation period begins (Nagorsen and Brigham 1993).

This species feeds on insects, including members of the orders Lepidoptera, Coleoptera, Neuroptera, Diptera, Hemiptera, Homoptera, and Hymenoptera (Caceres and Barclay 2000), which it obtains by hawking air-borne insects and by gleaning them from leaves and branches (Caceres and Pybus 1997). These bats forage mainly on forested hillsides and ridges, rather than in streamside and floodplain forests (Harvey et al. 1999).

Mating takes place in late summer or early fall and females store sperm until they emerge from hibernation in the spring, when ovulation and fertilization occur. Some individuals mate again upon emergence (Racey 1982). Gestation lasts 50 to 60 days, and parturition occurs in early to mid-summer. Females bear a single offspring annually, and young-of-the-year may mate prior to hibernation in the fall (Caceres and Barclay 2000, NatureServe 2013). Though some may roost alone, females often roost colonially. The largest maternity colony reported contained 39 adult

females (Dickinson et al. 2009). Females exhibit high site fidelity to maternity roosts, returning annually to their natal sites. Males and non-reproductive females generally roost singly during the summer months (Caceres and Pybus 1997).

Habitat Requirements

Northern long-eared bats use caves or mines in winter and generally roost in trees during the summer. This species is not considered to be migratory; however, summer habitat and hibernacula have been found to be as far apart as 35 miles (Nagorsen and Brigham 1993). Maternity colonies are typically housed in cavities and under the peeling bark of snags and decaying trees (Caceres and Pybus 1997). Within winter hibernacula the northern long-eared bat appears to prefer deep crevices (Caceres and Barclay 2000).

Summer habitat for the northern long-eared bat generally consists of mature forest. Characteristics of potential summer habitat were summarized by the CBD (2010) as an uneven forest age, containing trees with advanced age (100 years old or older), a multi-layered vertical structure, single and multiple tree-fall gaps, standing snags, and woody debris.

In addition to its preference for more mature forests, northern long-eared bats are reliant on intact, interior forest; site occupancy has been documented as being inversely related to the proportion of edge habitat within a patch (Yates and Muzika 2006). Habitat fragmentation may thus present a major threat, particularly to summer roosting habitat. Lacki and Schwierjohann (2001) found that abundance was highest in stands of forest where tree species diversity was highest. Also, northern long-eared bats have a noted preference for feeding in the vicinity of ephemeral upland pools (Brooks and Ford 2005, Owen et al. 2003).

Northern long-eared bats have been reported to occasionally use bridges as roosting structures (Ferrara and Leberg 2005, Feldhamer et al. 2003). Additionally, Ormsbee et al. (2007) reported northern long-eared bats using bridges as temporary night roosts, as well as a variety of other structures such as mines and houses. However, the overall importance of bridges to this species is not well documented.

E. Survey Methodology

Habitat Impact Analysis

A karst features GIS layer was used to determine the nearest potential winter hibernacula for Indiana bats and northern long-eared bats (Figure 4). All forested stands within the project survey limits were digitized in ESRI® ArcGIS 10.2™ using recent aerial photography. Field data were used

to complete an initial qualitative maternity habitat assessment on forested polygons within the survey limits (Appendix A).

Polygons of forested habitat were determined to be “suitable” or “unsuitable” for tree roosting bats based on field observations. Suitable habitat may include uneven-aged mixed or hardwood dominated forest with the potential to continually supply the canopy with mature trees with exfoliating bark and snags. Highly desirable roost trees are often emergent snags with cracks and crevices or trees with exfoliating bark, receiving more direct sunlight during the day than other trees.

Georeferenced clearing limits were then used to calculate the amount of forested habitat that would be impacted by the proposed reservoir (i.e., the forested habitat shapefile was clipped using the clearing limits shapefiles) (Figure 5). This approach was used to determine the loss of potential Indiana bat and northern long-eared bat habitat categorized by habitat suitability. For the purpose of this report, suitable habitat for these two species was considered synonymous.

Additional impacts to Indiana bat and northern long-eared bat habitat include habitat fragmentation (splitting of large blocks into smaller blocks) and loss of connectivity between forested patches. Thorough field surveys of habitat quality were conducted within the proposed direct clearing area. Aerial imagery was used for preliminary reconnaissance of the entire study area and interpreted qualitatively to assess forest resources adjacent to the project that may be indirectly affected by the reservoir project from a landscape ecology perspective. For bat foraging and commuting habitat, the size and connectedness of corridors, the access to other potential roosting and maternity areas and/or large blocks of uneven-aged forest, and the surrounding land use were assessed. The location, type, and quality of streams were also documented.

Mist Net Survey

The mist net survey was conducted in compliance with guidelines contained in the “2015 Range-wide Indiana Bat Summer Survey Guidelines” (USFWS 2015b), which are acceptable for use for northern long-eared bat surveys in 2015, and survey modifications specific to the state of Georgia as approved by the USFWS Georgia Field Office and the Georgia Department of Natural Resources (GNDR). These guidelines call for one net site, consisting of three independent net sets at least 30 meters apart, to be netted for three calendar nights (nine total “net nights”) per 123 acres of suitable habitat for nonlinear projects. For linear projects, one net site, consisting of two independent net sets at least 30 meters apart are to be netted for two calendar nights (four total “net nights”) per kilometer of suitable habitat. Surveys are to be conducted between May 15 and August 15 and are temperature and precipitation dependent.

Six non-linear survey sites were each surveyed for three consecutive calendar nights, and during each calendar night three net sets were erected at each survey site (nine total “net-nights” per

non-linear survey site). Additionally, two linear sites were each surveyed for two consecutive calendar nights, and during each calendar night two net sets were erected at each survey site (four total “net-nights” per linear survey site). Net sets were customized for each site and placed approximately perpendicular across flight corridors, filling the corridor from side to side and from the ground or stream bed to the overhanging canopy to completely block the flight corridor. Various combinations of ropes and poles were used to support the mist nets and were based on the specific flight corridor height to be covered.

The surveys commenced at sunset and lasted for no less than five hours. Nets were checked for bats in 10 minute intervals by two-person teams at each survey site. Netting did not take place during nights of continuous rain, cold temperatures (<50°F), or heavy wind. If capture rates were low at a particular site, nets were relocated on the second and/or third night of sampling in an effort to increase capture success.

Captured bats were identified to species, sexed, weighed, aged, had their sexual condition determined, and right forearm length measured. Potential evidence of WNS was determined using the Reichard Wing Damage Index (Reichard and Kunz 2009). Bats were released, unharmed, at the capture site within 30 minutes of removal from the net.

The survey crews adhered to the White-Nose Syndrome Decontamination Protocol as set forth by the USFWS Version 06.25.2012 (the most current version at the time of survey; USFWS 2012b).

Since both species under consideration are known to roost in bridge/culvert crevices of 0.5 to 1.0 inch wide at various times (Keeley and Tuttle, 1999), bridge/culvert structures in the study area were checked for the presence of bats during this monitoring effort.

Acoustic Monitoring

Eco-Tech conducted acoustic sampling concurrent with mist netting. One Anabat SD2 acoustic detector was placed at each acoustic survey site in a location that best sampled habitat with little to no canopy closure and which was not conducive to mist net placement. Acoustic sampling was conducted on all nights of netting. The acoustic detectors were housed in approved weatherproofing containers utilizing 45° PVC microphone protection. The detectors were powered by 12v batteries housed within the weatherproofing. The acoustic detectors were set in areas that maximized the chances of acoustic detection of the species while minimizing interference from vegetative clutter and debris. The detectors were deployed from 20:00 to 06:00 hours Eastern Daylight Time (EDT) each night of sampling.

Data were recorded on Compact Flash (CF) cards and analyzed daily to determine appropriate functioning of the detectors and for documentation of the previous night’s bat presence. The detectors were programmed to record from sunset to a minimum time period of five hours in

order to correspond with approximate peak bat activity periods (USFWS 2007). The detectors were set with an audio division of 16 and a data division ratio of 8. Sensitivity was initially set to 7 (of 10). Biologists monitored the units throughout the night and adjusted sensitivity as needed in response to excess insect noise.

Acoustic Data Analysis

Bat call data were analyzed using the software program EchoClass v3.0. This automated software program is designed to identify bat calls to the species level throughout the Eastern U.S. EchoClass was developed by Dr. Eric Britzke, in conjunction with the U.S. Army Engineer Research and Development Center. For this study, calls were analyzed using “Species Set #1”, as this species set is capable of scanning files for 12 of the 15 bat species with the potential to occur in the project area. EchoClass is not programmed to identify Rafinesque’s big-eared bats (*Corynorhinus rafinesquii*), Seminole bats (*Lasiurus seminolus*), or Mexican free-tailed bats (*Tadarida brasiliensis*). The output file produced for this study was used to identify the presence and relative activity of echolocating bats. In addition to species identification at the file level, EchoClass produces a nightly Maximum Likelihood (ML) p-value for the null hypothesis that a species is not present at a site on a given night. A low p-value indicates that a species is likely present at a site.

In accordance with the USFWS (2015b) and state of Georgia survey guidelines, manual qualitative analysis is to be conducted, at a minimum, on all files when a federally-listed bat species was [likely] present according to automated software. Therefore, call sequences were analyzed qualitatively by Eco-Tech when EchoClass identified a call sequence as belonging to the genus *Myotis*. Suspected *Myotis* call sequences were evaluated based on characteristics such as shape, slope, and the minimum frequency of pulses, as well as general call pattern (Corben Anabat Techniques Workshop 2010).

Bat call enumeration can be somewhat misleading due to uncertainties about the behavior of the bats being recorded. Multiple calls from the same species may represent many separate individuals or multiple passes by a small number of individuals. As an indication of relative bat activity, we have included the number of files passing the noise filter in the acoustic results table (Tables 2 & 3). This should not be considered an indicator of the number of individual bats in the area.

F. Preparatory Data

Eco-Tech completed a study plan using mapping provided by the County, describing the project location, proposed level-of-effort, and survey methodology. This plan was submitted to USFWS

and GANDR on June 5, 2015. Official concurrence was received on June 9, 2015. A copy of the approved study plan can be found in Appendix B.

G. Habitat Types

A Phase 1 summer roosting habitat assessment for Indiana bats and northern long-eared bats was conducted on June 9, 2015 by Eco-Tech. Eco-Tech surveyed within the study area in accordance with the 2015 Range-wide Indiana Bat Summer Survey Guidelines, in order to assess available habitat types within the study area. The study area is dominated by mixed secondary growth deciduous hardwood forests, pine plantation, and pasture.

The study area is characterized by three forest communities suitable for roosting by Indiana bats and northern long-eared bats:

Mature Hardwood Community

The mature hardwood community was comprised of white oak (*Quercus alba*), tulip poplar (*Liriodendron tulipifera*), southern red oak (*Q. falcata*), sourwood (*Oxydendrum arboreum*) mockernut hickory (*Carya tomentosa*), pignut hickory (*C. glabra*), and river birch (*Betula nigra*) dominated by stems within the medium diameter class with approximately 50% of the stems measuring 9 to 15 inches diameter at breast height (dbh). Approximately 25% of the stems were within the small diameter class measuring 3 to 8 inches dbh, and 25% of the stems were within the large diameter class measuring >15 inches dbh. Suitable snags were found within the habitat observation plots: HW-A, HW-B, HW-C, HW-D, HW-E, and HW-F (Figure 5).

Mature Mixed Hardwood Community

The mixed hardwood community was comprised of loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), and black cherry (*Prunus serotina*) and dominated by stems in the small and medium diameter classes with approximately 35% of stems measuring 3 to 8 inches dbh and approximately 35% of stems measuring 9 to 15 inches dbh. The remaining 30% of the stems were within the large diameter class measuring >15 inches dbh. No suitable snags were found within the habitat observation plots: MH-A, MH-B, and MH-C (Figure 5).

Pine Plantation Community

The pine plantation community was comprised of loblolly pine and dominated by stems within the small and medium diameter class with approximately 45% of the stems measuring 3 to 8 inches dbh and approximately 45% of the stems measuring 9 to 15 inches dbh. Approximately

10% of the stems were within the large diameter class measuring >15 inches dbh. Less than five suitable snags were found within the habitat observation plots: PP-A, and PP-B (Figure 5).

H. Field Survey Conditions

The most notable habitat present within the study area with regards to Indiana bats and northern long-eared bats are the numerous trails and small access roads that are found within the heavily forested study area. Additionally, Flat Creek, the only notable stream corridor that is present within the study area, provides foraging and flyway habitat.

Weather conditions June 13 – June 23, 2015 were generally favorable for conducting mist netting and acoustic surveys. Night time temperatures ranged from 68°F to 88°F over the survey period with wind and fog being negligible. Relative humidity was high, greater than 60%.

Photographs of net sites are included in Section M. Descriptions and sketches of each net site, along with additional wildlife observed and general comments pertaining to each net site are included on survey data forms in Appendix C. A detailed description of the mist net and acoustic location is included below.

Mist Net Site R1

Mist Net Site R1 was located on Flat Creek, a perennial stream with substrate composed of cobble and sand. At the time of the survey, Flat Creek had a bank height of 2.5 meters, channel width of 9 meters, and wetted width of 8 meters. The site was located at the southwestern edge of an overgrown cattle pasture where the stream entered the forest. Net A, Net B, and Net C were 6 meters wide and 6 meters high and deployed across Flat Creek. The canopy at Site R1 was dominated by boxelder (*Acer negundo*), black walnut (*Juglans nigra*), and tulip poplar with an average dbh of 18 inches. The canopy closure at Site R1 was 90 to 100% at the time of the survey. The understory at Site R1 was clear on the right bank of the stream; however, it was very dense on the left bank and dominated by red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), and muscledwood (*Carpinus caroliniana*) with an average dbh of 4 inches.

Mist Net Site R2

Mist Net Site R2 was located on Flat Creek upstream of Glade Farm Road where the stream exits a large, contiguous block of forest. At the time of the survey, this section of Flat Creek had a depth of 0.5 meter, channel width of 9 meters, wetted width of 8.5 meters, and a substrate consisting of sand and cobble. Net A, Net B, and Net C were deployed across Flat Creek. Nets A and B were 9 meters wide by 6 meters high and Net C was 6 meters wide and 6 meters high. The canopy at site 2 was dominated by water oak (*Quercus nigra*), river birch, and American sycamore

(*Platanus occidentalis*) with an average dbh of 18-20 inches. The canopy closure at site R2 was 50-85% at the time of the survey. The understory at site R2 was very dense and dominated by musclewood and river birch with an average dbh of 4-6 inches.

Mist Net Site R3

Mist Net Site R3 was on a forested road, accessed from Glade Farm Road, along a five-acre emergent/scrub-shrub wetland (Glade Lake). Net A and Net B were deployed across the main road. Net A was 4 meters wide and 6 meters high and Net B was 6 meters wide and 6 meters high. Net C was deployed across an old roadbed leading to the wetland; it was 4 meters wide and 6 meters high. The canopy at Site R3 was dominated by white oak, water oak, pignut hickory, and tulip poplar with an average dbh of 18-20 inches dbh. The canopy closure at site 3 was 80-95% at the time of the survey. The understory at Site R3 was moderately dense and dominated by black cherry, shortleaf pine (*Pinus echinata*), and American hophornbeam (*Ostrya virginiana*) with an average dbh of 6-8 inches.

Mist Net Site R4

Mist Net Site R4 was located in a narrow hardwood riparian corridor on an access road in the northern portion of the project. Net A, Net B, and Net C were located on the forested road. Net A was 6 meters wide and 6 meters high. Net B and Net C were 4 meters wide and 6 meters high. The canopy at site R4 was dominated by loblolly pine, tulip poplar, and white oak with an average dbh of 18 inches. The canopy closure at site R4 was 55-80% at the time of the survey. The understory was moderately dense and dominated by tulip poplar and white oak with an average dbh of 5 inches.

Mist Net Site R5

Mist Net Site R5 was located in a narrow valley on Flat Creek in a bottomland forest, downstream of Flat Creek Shoals. This section of Flat creek had depth of 1.25 meters, a channel width of 7.75 meters, a wetted width of 6 meters, and a substrate consisting of sand. Net A, Net B, and Net C were located on Flat Creek. Net A and Net B were 6 meters wide and 6 meters high. Net C was 4 meters wide and 6 meters high. The canopy at site R5 was dominated by white oak, river birch, and tulip poplar with an average dbh of 22-26 inches. The canopy closure at site R5 was between 70-80% at Net B and Net C and 10% at Net A at the time of the survey. The understory was moderately dense and dominated by river birch, flowering dogwood, and musclewood with an average dbh of 5-8 inches.

Mist Net Site R6

Mist Net Site R6 was located on Flat Creek approximately half way between sites R2 and R5. Flat Creek had a depth of 1.5 meters, channel width of 8 meters, wetted width of 8 meters, and a dominate substrate of sand. Net A, Net B, and Net C were located on Flat Creek. Net A and Net B were 6 meters wide and 6 meters high. Net C was 4 meters wide and 6 meters high. The canopy at site R6 was dominated by tulip poplar, muscledwood, and white oak. The canopy closure at site R6 was 50-60 % at the time of the survey. The understory was very dense and dominated by silver maple (*Acer saccharinum*), silverbell (*Halesia tetraptera*), and muscledwood with an average dbh of 4 inches.

Mist Net Site P1

Mist Net Site P1 was located on Romey Savage Road, east of the electrical utility ROW within the proposed pipeline study buffer. Net A and Net B were both deployed across the gravel road. Net A was 9 meters wide and 6 meters high. Net B was 6 meters wide and 6 meters high. The canopy at site P1 was dominated by loblolly pine, tulip poplar, and white oak with an average dbh of 30 inches. The canopy closure at site P1 was 70-80% at the time of the survey. The understory was dominated by devil's walking stick (*Aralia spinosa*), sweetgum, and northern red oak (*Quercus rubra*) with an average dbh of 10 inches.

Mist Net Site P2

Mist Net Site P2 was located on a forested road on a ridge adjacent to the Chattahoochee River. Net A and Net B were deployed across the forested road and were 6 meters high and 6 meters wide. The canopy was dominated by loblolly pine, tulip poplar, and black cherry with an average dbh of 30 inches. The canopy closure at site P2 was 70-80 % at the time of the survey. The understory was very dense dominated by eastern red cedar (*Juniperus virginiana*) and red maple with an average dbh of 10 inches.

On the second night of netting, both nets were moved to a different section of the road and renamed due to low capture rates. Net C was 4 meters wide and 6 meters high. Net D was 6 meters wide and 6 meters high. The canopy was dominated by tulip poplar and white oak with an average dbh of 15 inches. The canopy closure was 90-95 % at the time of the survey. The understory was moderately dense and dominated by silver maple, tulip poplar, and black cherry with an average dbh of 5 inches.

Acoustic Detector Site R1

Acoustic Detector Site R1 was located within the large pasture adjacent to Flat Creek, downstream of Glade Farm Road. This stretch of Flat Creek was not suitable for mist netting at the time of the survey; however, the open pasture provided foraging habitat and the neighboring forested habitat provided roosting habitat for the Indiana bat and northern long-eared bat.

Acoustic Detector Site R2

Acoustic Detector Site R2 was located within the large pasture adjacent to Flat Creek, upstream of Glade Farm Road. Similar to Site R1, Site R2 was located along a section of Flat Creek which was not suitable for mist netting at the time of the survey. However, it was in close proximity to a forested floodplain and upland forest providing suitable roosting habitat.

Acoustic Detector Site R3

Acoustic Detector Site R3 was located in a 5-acre wetland located in what was previously Glade Lake. The open water and canopy provided foraging habitat for bats. Also, there were multiple standing snags along the perimeter of the wetland and neighboring forest which provided suitable roosting habitat.

Acoustic Detector Site R4

Acoustic Detector Site R4 was located on an access road within the pine plantation habitat. The acoustic detector was positioned at the intersection of two forested roads. The surrounding habitat contained a high density of suitable hardwood snags.

Acoustic Detector Site R5

Acoustic Detector Site R5 was located in the corner of a pasture by an unnamed tributary, which feeds Flat Creek. The creek and surrounding habitat were not suitable for mist netting. However, the adjacent forested floodplain had a high density of suitable hardwood snags.

Acoustic Detector Site R6

Acoustic Detector Site R6 was located in the southwest portion of the project in a thinned stand of hardwoods off of Glade Farm Road. The thinned stand provided roosting habitat for both the Indiana bat and northern long-eared bat. It was dominated by mature white oak and tulip poplar with a number of standing snags receiving ample solar exposure.

Acoustic Detector Site P1

Acoustic Detector Site P1 was located within the powerline ROW adjacent to Romey Savage Road. The ROW provides bats with a flight corridor; however, the power lines inhibit mist net surveys for safety reasons. The surrounding habitat was dominated by loblolly pine with hardwoods dispersed throughout the matrix.

Acoustic Detector Site P2

Acoustic Detector Site P2 was located in a small pasture surrounded by a hardwood forest. The pasture was adjacent to the Chattahoochee River providing excellent foraging habitat. The surrounding habitat was dominated by mature hardwoods, including white oak, with a high density of suitable standing snags.

I. Species Occurrence Results

Mist net surveys were conducted June 13-23, 2015, within the study area. A comprehensive capture summary table is included in Appendix D.

Mist Net Capture Results

Forty-nine big brown bats (*Eptesicus fuscus*), 19 eastern red bats (*Lasiurus borealis*), and four evening bats (*Nycticeius humeralis*) were captured at 8 survey sites within the 2,279-acre study area (Table 1). No other species were encountered, including the Indiana bat or northern long-eared bat. Biologists inspected the bridge over Flat Creek on Glade Farm Road for bats or bat guano. No bats or sign of bat use were observed within this structure during daylight hours.

Table 1. Bat capture summary table, showing number of individuals captured for the proposed Glades Water Supply Reservoir project located in Hall, County, Georgia, June 13-June 23, 2015.

Site	Coordinates	Date	<i>Eptesicus fuscus</i>	<i>Lasiurus borealis</i>	<i>Nycticeius humeralis</i>	Total
R1	34.41434 -83.73481	6/16/2015	4	3	1	8
		6/17/2015	4	2		6
		6/18/2015	1	1		2
R2	34.42665 -83.73970	6/15/2015	7	4		11
		6/16/2015	2	1		3
		6/17/2015		3		3
R3	34.42286 -83.74181	6/13/2015	2			2
		6/14/2015	2			2
		6/15/2015				
R4	34.43208 -83.73898	6/2/2015		1		1
		6/3/2015				
		6/4/2015				
R5	34.44149 -83.76448	6/21/2015	3	2	2	7
		6/22/2015	1			1
		6/23/2015	1	1	1	3
R6	34.43372 -83.74818	6/19/2015				
		6/20/2015				
		6/21/2015	1			1
P1	34.44133 -83.73560	6/17/2015	11			11
		6/18/2015	10	1		11
P2	34.46394 -83.68996	6/19/2015				
		6/22/2015				
Total			49	19	4	72

Acoustic Monitoring Results

As proposed, one Anabat SD2 acoustic detector site was monitored concurrent with mist netting at each acoustic survey site. During 22 survey nights of acoustical sampling EchoClass reported 3,861 noise-filtered files, 42 of which were *Myotis* spp. call sequences (Tables 2 and 3). Representative acoustic sonograms are included in Appendix E.

Among the calls identified as *Myotis* spp. by EchoClass, Eco-Tech identified two tri-colored bat (*Perimyotis subflavus*) call sequences, four eastern red bat call sequences, four unknown bat call sequences, six indistinguishable *Myotis* spp. call sequences, and 25 big brown bat/silver-haired bat (*Lasionycteris noctivagans*) call sequences (Table 4). Additionally, one file was determined to contain both a tri-colored bat call sequences and a call sequence from an unknown species. Eastern bats in the genus *Myotis* produce calls similar to one another with minimum frequencies

of approximately 40 to 45 kHz and often pose problems for acoustic analysis software. In addition, there are a number of non-*Myotis* species that can produce calls with quantitative and qualitative parameters that are easily confused with *Myotis* spp. including eastern red bats and tri-colored bats.

Several *Myotis* species, including the northern long-eared bat, little brown bat, eastern small-footed bat (*Myotis leibii*), and Indiana bat have calls with similar characteristics which often make these calls nearly indistinguishable with acoustic analysis software. For example, Eco-Tech agrees that several suspected Indiana bat and little brown bat call sequence were produced by indistinguishable *Myotis* species.

Additionally, EchoClass often mistakes big brown bat and/or silver-haired bat call sequences (difficult to distinguish where they both occur) as northern long-eared bat call sequences when the call sequences contain broken sound pulses due to vegetative clutter, water reflection, or a poor connection between the sound and the microphone. In these cases, EchoClass often incorrectly recognizes the broken call sequence as two separate species, and the top portion of the broken call is misidentified as a northern long-eared bat call sequence (E. Britzke, personal communication 2015). This automated error is easily recognized by qualitative identification, and was recognized for 25 suspected *Myotis* spp. call sequences in this dataset.

The federally endangered gray bat is the most distinctive eastern *Myotis* species in that it typically produces calls with abrupt bends and associated decreases in slope at the toe of sound pulses. However, in high clutter situations, tri-colored bat call sequences can be easily confused with the hooked calls of gray bats. Additionally, gray bats can frequently be confused with other species in the genus *Myotis*. However, this species can frequently be discerned through manual analysis via interpretation of variables such as slope, call shape, context of call sequence time relative to other calls, and context of suitable habitat and known nearby presence records. Based on these factors, Eco-Tech believes that the presence of the gray bat is unlikely.

The study area provided suitable roosting, foraging, and flyway habitat for Indiana bats and northern long-eared bats. In 22 survey nights of simultaneous mist netting and acoustic sampling, three species of bats were captured. However, EchoClass identified 10 potential species using ultrasonic bat detectors, including the big brown bat, the silver-haired bat, the eastern red bat, the hoary bat (*Lasiurus cinereus*), the gray bat, the eastern small-footed bat, the northern long-eared bat, the Indiana bat, the evening bat, and the tri-colored bat. As indicated by the contrasts in mist netting results and acoustic results, both survey types are important for considering species presence and identification.

Table 2. EchoClass automated acoustic analysis results table, showing number of files recorded containing each species for the proposed Glades Water Supply Reservoir project located in Hall, County, Georgia, June 13-June 23, 2015.

Site	Coordinates	Date	<i>Eptesicus fuscus</i>	<i>Lasionycteris noctivagans</i>	<i>Lasiurus borealis</i>	<i>Lasiurus cinereus</i>	<i>Myotis austroriparius</i>	<i>Myotis grisescens</i>	<i>Myotis leibii</i>	<i>Myotis lucifugus</i>	<i>Myotis septentrionalis</i>	<i>Myotis sodalis</i>	<i>Nycticeius humeralis</i>	<i>Perimyotis subflavus</i>	Unknown	Total	
R1	34.41735 -83.73508	6/13/2015	35	2	27	10										99	173
		6/14/2015	28	1	24	2							1			98	154
		6/15/2015	4	7	9	3							1	1		39	64
R2	34.426397 -83.738501	6/13/2015															
		6/14/2015	10	4	33	17							1			95	160
		6/15/2015	7	1	30	6		1			1		8			77	131
R3	34.422324 -83.739394	6/19/2015	108	11	88	6					6		4	84		203	510
		6/20/2015	27	7	30	12					2		10	86		138	312
		6/21/2015	42	3	66	5		3			5		7	84		232	447
R4	34.431483 -83.738042	6/16/2015	11	1	36	1				1			1	1		72	124
		6/17/2015	3	1	33	1						1		1		72	112
		6/18/2015	4	3	17											47	71
R5	34.424537 -83.730506	6/16/2015	7	7	23	22					1		4	1		119	184
		6/17/2015	4	11	18	25					1		1	1		131	192
		6/18/2015	9	1	11	10					2		1	1		75	110
R6	34.41899 -83.74445	6/19/2015	6		30	1					1			1		79	118
		6/20/2015	1		28	1		1		1						73	105
		6/21/2015	3		29	1				2				1		42	78
P1	34.440614 -83.736175	6/16/2015	40	4	65	5		2			6		1	5		94	222
		6/17/2015	18	5	30	1					2			3		48	107
P2	34.463985 -83.687886 34.463390 -83.690730	6/18/2015			43								1	2		67	113
		6/19/2015	3		7	2		1								23	36
TOTAL			394	76	741	152		9		4	28	1	52	273	2131	3861	

Table 3. EchoClass automated acoustic analysis results table, showing maximum likelihood of occurrence statistics for each species for the proposed Glades Water Supply Reservoir project located in Hall, County, Georgia, June 13-June 23, 2015. *P*-values represent the probability that all sequences of a particular species are incorrectly identified, i.e. lower *P*-value classifications (1-4) indicate a higher likelihood of occurrence.

Coordinates	Date	<i>Eptesicus fuscus</i>	<i>Lasiorycteris noctivagans</i>	<i>Lasiurus borealis</i>	<i>Lasiurus cinereus</i>	<i>Myotis austroriparius</i>	<i>Myotis grisescens</i>	<i>Myotis leibii</i>	<i>Myotis lucifugus</i>	<i>Myotis septentrionalis</i>	<i>Myotis sodalis</i>	<i>Nycticeius humeralis</i>	<i>Perimyotis subflavus</i>
R1	34.41735 -83.73508	6/13/2015	1	4	1	4							
		6/14/2015	1	1*	1	4						1*	
		6/15/2015	1	1	1	4						1*	1*
R2	34.426397 -83.738501	6/13/2015	1	4	1	1	1*			1*		4	1*
		6/14/2015	1	4	1	1						1*	
		6/15/2015	1	1*	1	2	1*			1*		4	
R3	34.422324 -83.739394	6/19/2015	1	4	1	4				1		4	1
		6/20/2015	1	4	1	4				1		4	1
		6/21/2015	1	4	1	4	3			1		4	1
R4	34.431483 -83.738042	6/16/2015	1	1*	1	1*			1*			1*	1*
		6/17/2015	1	1*	1	1*					1*		1*
		6/18/2015	1	2	1								
R5	34.424537 -83.730506	6/16/2015	1	2	1	1				1*		4	1*
		6/17/2015	1	1	1	1				1*		1*	1*
		6/18/2015	1	1*	1	1				1		1*	1*
R6	34.41899 -83.74445	6/19/2015	1		1	1*				1*			1*
		6/20/2015	1*		1	1*	1*		1*				
		6/21/2015	1		1	1*			1				1*
P1	34.440614 -83.736175	6/16/2015	1	4	1	4	1			1		1*	1
		6/17/2015	1	4	1	1*				1			1
P2	34.463985 -83.687886	6/18/2015			1							1*	1
	34.463390 -83.690730	6/19/2015	1		1	4	1*						

1: $P < 0.05$; 2: $0.05 < P < 0.25$; 3: $0.25 < P < 0.50$; 4: $P > 0.5$;

1*: only one sequence of a particular species detected

**Rainout event

Table 4. Qualitative acoustic call identification by Eco-Tech Consultants of files classified as species in the genus *Myotis* by automated software program EchoClass for the proposed Glades Water Supply Reservoir project located in Hall, County, Georgia, June 13-June 23, 2015.

File #	Site	Date	EchoClass	Eco-Tech
1	R-2	6-13-2015	MYGR	UNKN
2			EPFU; MYSE*	EPFU/LANO
3		6-15-2015	MYSE; LABO*	LABO
4			MYGR	UNKN
5	R-3	6-19-2015	EPFU; MYSE*	EPFU/LANO
6			MYSE; LABO*	EPFU/LANO
7			MYSE; EPFU*	EPFU/LANO
8			EPFU; MYSE*	EPFU/LANO
9			MYSE; UNKN*	EPFU/LANO
10			MYSE; LABO*	EPFU/LANO
11		6-20-2015	UNKN; MYSE*	EPFU/LANO
12		6-21-2015	MYSE; UNKN*	EPFU/LANO
13			EPFU; MYSE*	EPFU/LANO
14			MYGR; LABO*	PESU; UNKN
15			MYGR	PESU
16			EPFU; MYSE*	EPFU/LANO
17			EPFU; MYSE*	EPFU/LANO
18			MYSE; EPFU*	EPFU/LANO
19			MYSE; EPFU*	EPFU/LANO
20			MYGR	PESU
21	R-4	6-16-2015	MYLU	MYsp
22		6-17-2015	MYSO	MYsp
23	R-5	6-16-2015	EPFU; MYSE*	EPFU/LANO
24		6-17-2015	UNKN; MYSE*	EPFU/LANO
25		6-18-2015	MYSE; EPFU*	EPFU/LANO
26			UNKN; MYSE*	EPFU/LANO
27	R-6	6-19-2015	LABO; MYSE*	EPFU/LANO
28		6-20-2015	MYGR	MYsp
29			MYLU	MYsp
30		6-21-2015	MYLU	MYsp
31			MYLU	LABO
32	P-1	6-16-2015	LABO; MYSE*	EPFU/LANO
33			EPFU; MYSE*	EPFU/LANO
34			MYGR	MYsp
35			EPFU; MYSE*	EPFU/LANO
36			MYSE	UNKN
37			EPFU; MYSE*	EPFU/LANO
38			MYGR	LABO
39			EPFU; MYSE*	EPFU/LANO
40		6-17-2015	MYSE	LABO
41			UNKN, MYSE*	EPFU/LANO
42	P-2	6-19-2015	MYGR	UNKN

EPFU = *Eptesicus fuscus*, LABO = *Lasiurus borealis*, LANO = *Lasionycteris noctivagans*, MYGR = *Myotis grisescens*, MYLU = *M. lucifugus*, MYSO = *M. sodalis*, MYSE = *M. septentrionalis*, PESU = *Perimyotis subflavus*, UNKN = unknown species.

*EchoClass displays two species when two bats of different species are suspected to be present

J. Study Conclusion

Eco-Tech conducted mist netting and acoustic surveys June 13-June 23, 2015 within the study area to determine the presence or likely absence of Indiana bats and northern long-eared bats. Eight sites were surveyed within the study area using mist netting and nearby acoustic detectors.

Seventy-two bats from three species were captured. Acoustic analyses using EchoClass software identified 10 species potentially present in the area including the Indiana bat, gray bat, and northern long-eared bat. Manual analysis concurred that six of the software identified call sequences belonged to the genus *Myotis*, but species level classifications of these call sequences could not be determined.

No Indiana bat or northern long-eared bats were captured during this survey. Existing forested areas within the study area were comprised of suitable roosting and foraging habitat for Indiana bats and northern long-eared bats.

K. Potential Conservation Measures

The mist net and acoustic survey was conducted with the appropriate level of effort and under the appropriate conditions to investigate presence/likely absence of Indiana bats and northern long-eared bats during the maternity season for the proposed Glades Water Supply Reservoir in Hall County, Georgia. No caves or underground mines were located in the study area.

Indiana bat

No Indiana bats were captured during mist net surveys. One suspected Indiana bat call sequence was determined to be an indistinguishable *Myotis* species by manual analysis. Approximately 714 acres of suitable summer habitat were described from within the project study area (Table 5). The project is 38 miles from the nearest known maternity colony and is 2.5 miles from the nearest karst area. Additional potential winter habitat features (tunnels, underground mines, etc.) were not found to be present within the study area.

Based on the information collected, there are no conservation measures specifically aimed to benefit the Indiana bat suggested.

Northern long-eared bat

No northern long-eared bats were captured during mist net surveys. However, six indistinguishable *Myotis* spp. calls were confirmed by manual analysis. Approximately 714 acres of suitable summer habitat were described from within the project clearing area (Table 5). The

project is 10 miles from the nearest northern long-eared bat record and 2.5 miles from the nearest karst area. Additional potential winter habitat features (tunnels, underground mines, etc.) were not found to be present within the study area.

Based on the information collected, there are no conservation measures specifically aimed to benefit the northern long-eared bat suggested.

Table 5. Indiana bat and northern long-eared bat suitable summer roosting habitat/features associated with the proposed Glades Reservoir project located in Hall, County, Georgia,

Species	Roosting Habitat/Structures Present? If so, describe.	Habitat Suitable for Foraging? (Yes/No)	Habitat Suitable for Flyway? (Yes/No)
Indiana bat	Yes – 714 acres of suitable forested habitat	Yes	Yes
Northern long-eared bat	Yes – 714 acres of suitable forested habitat	Yes	Yes
Project Construction Date: TBD			

Table 6. Potential conservation measures to benefit federally listed species for the proposed Glades Reservoir project located in Hall, County, Georgia.

Common Name	Scientific Name	Recommended Conservation Measures
Indiana bat	<i>Myotis sodalis</i>	None
Northern long-eared bat	<i>Myotis septentrionalis</i>	None

L. Figures

Figure 1: Project Location Map

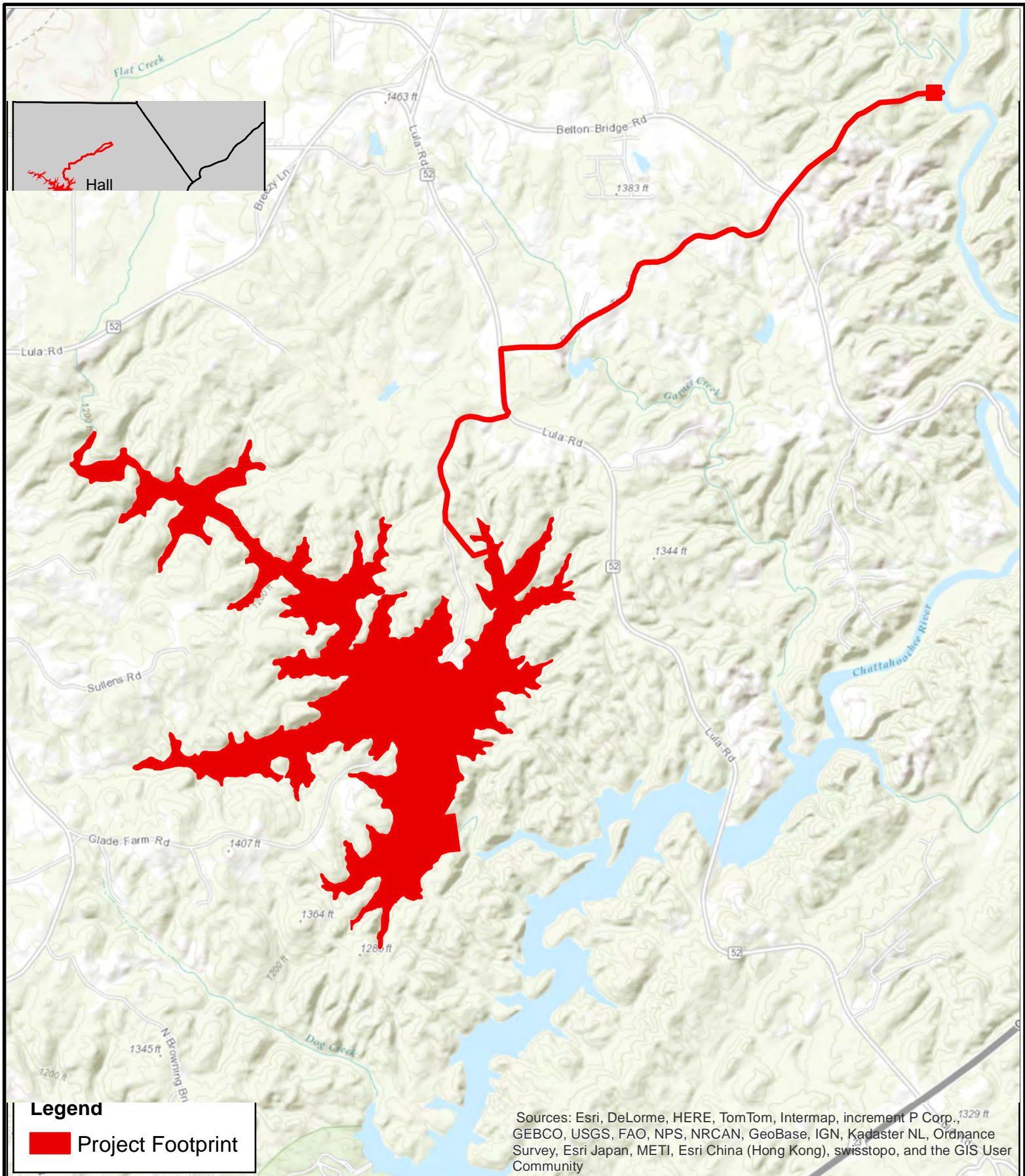
Figure 2: Indiana Bat Expected Range Map

Figure 3: Northern long-eared Bat Expected Range Map

Figure 4: Habitat Overview Map

Figure 5: Suitable Habitat Map

Figure 6: Bat Survey Map



**Proposed Glades Reservoir
Hall County, Georgia**



0 0.5 1 2 Kilometers

Imagery Source: ESRI

FIGURE 1

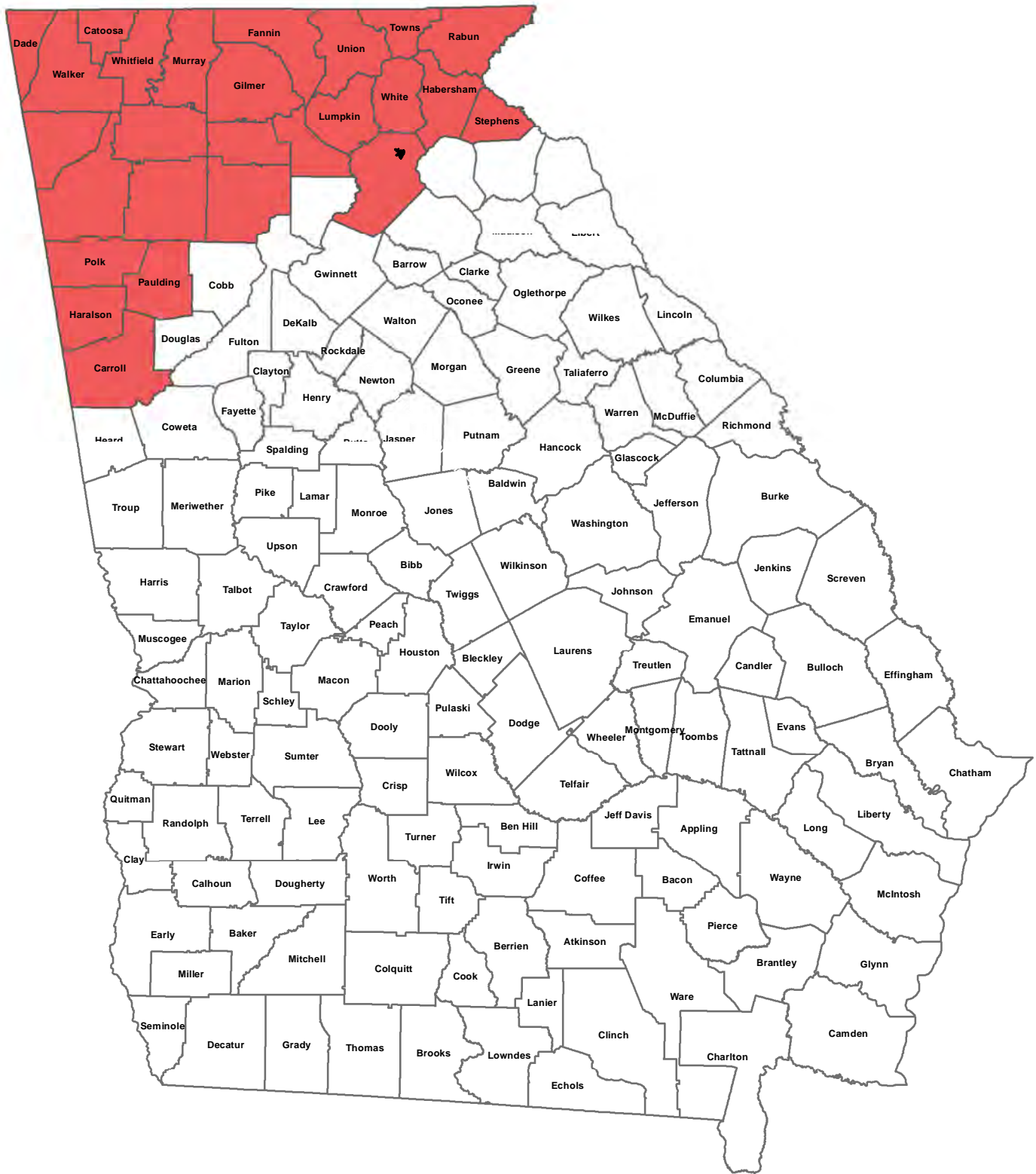
**Glades Reservoir
Project Location Map**



Drawn by: ABO | Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005



- Project Footprint
- Indiana Bat (*Myotis sodalis*) Section 7 Nexus (revised January 2015)

Proposed Glades Reservoir
Hall County, Georgia



0 45 90 180 Kilometers

Imagery Source: ESRI

FIGURE 2

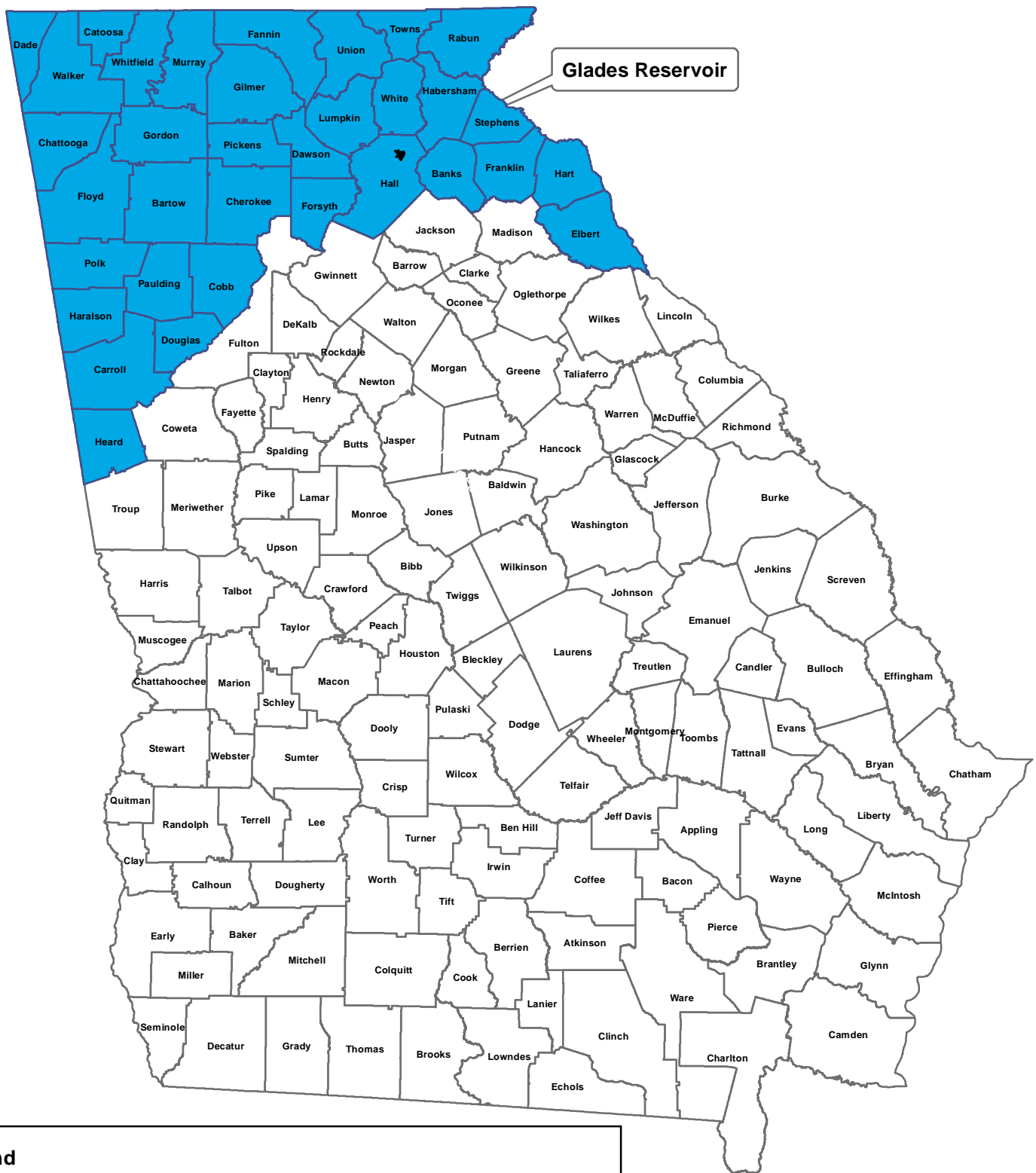
Indiana Bat
Expected Range Map



Drawn by: ABO | Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005



Proposed Glades Reservoir
Hall County, Georgia



0 45 90 180 Kilometers

Imagery Source: ESRI

FIGURE 3

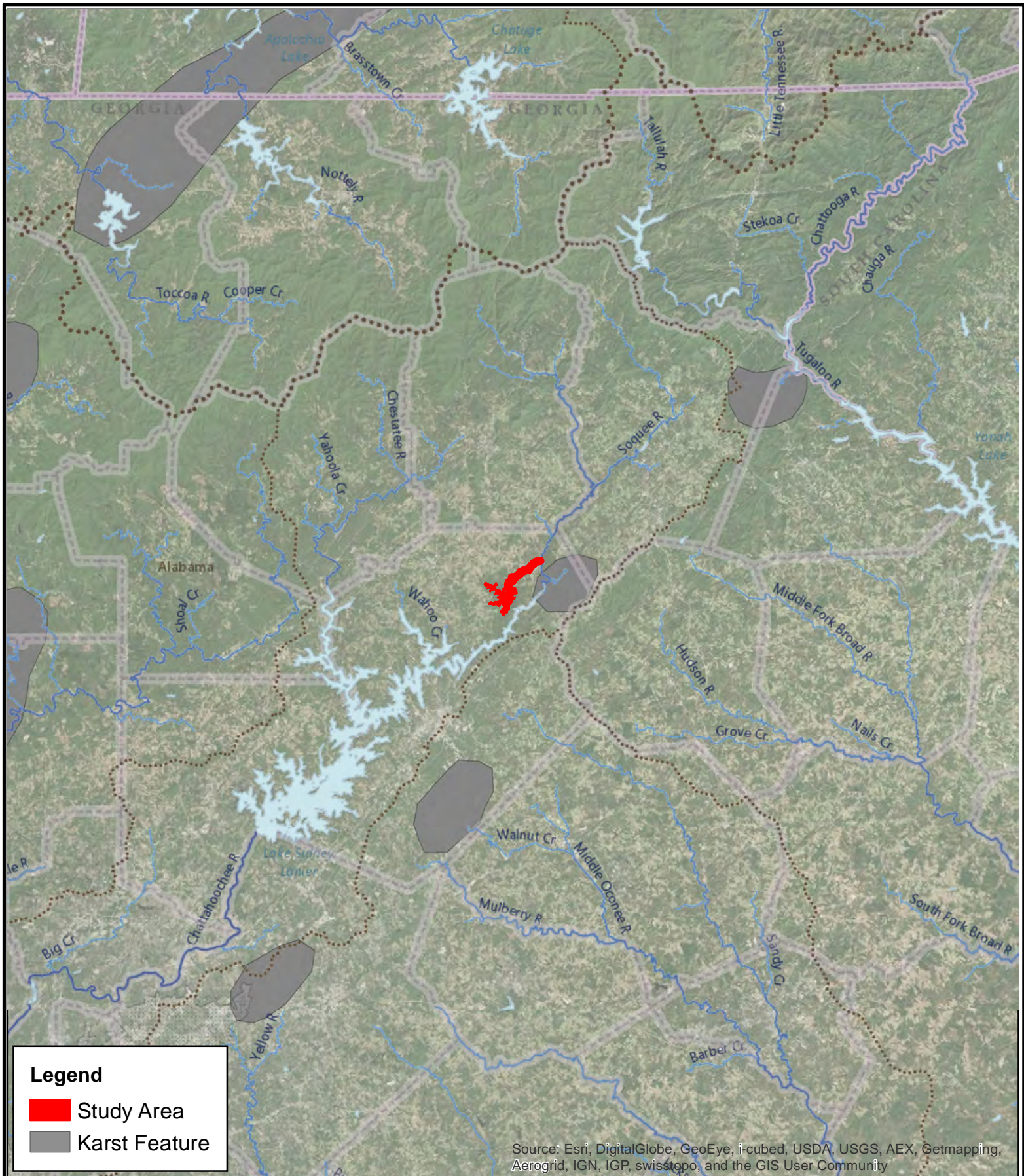
Northern Long-eared Bat
Known Range Map



Drawn by: ABO | Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005



**Proposed Glades Reservoir
Hall County, Georgia**



0 10 20 40 Kilometers

Imagery Source: ESRI

FIGURE 4

Habitat Overview Map



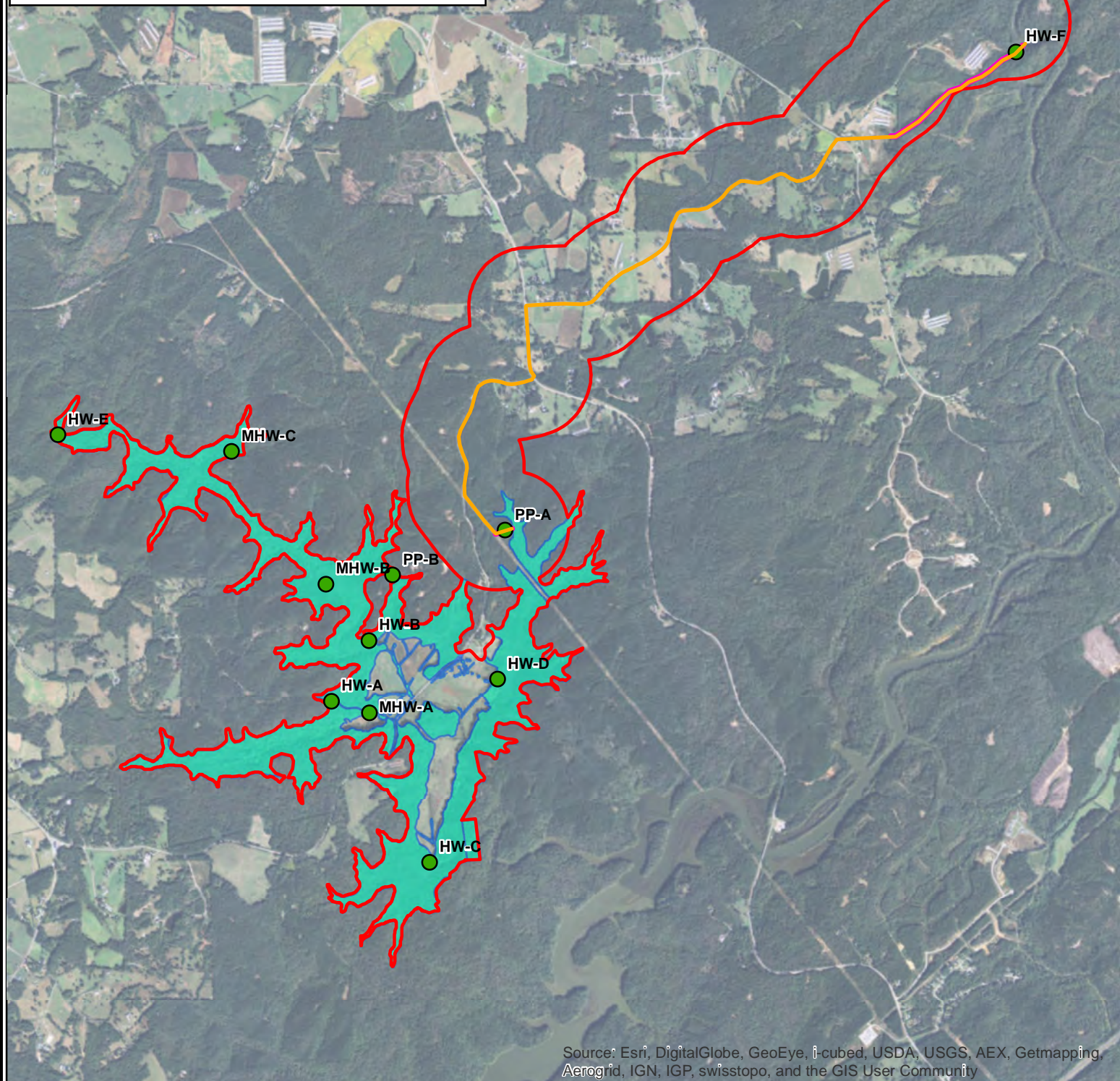
Drawn by: ABO | Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005

Legend

- Study Area
- Proposed Reservoir Forest Clearing
- Linear Forest Clearing (1.41 km)
- Habitat Observation Point



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

**Proposed Glades Reservoir
Hall County, Georgia**



0 0.5 1 2 Kilometers

Imagery Source: ESRI

FIGURE 5

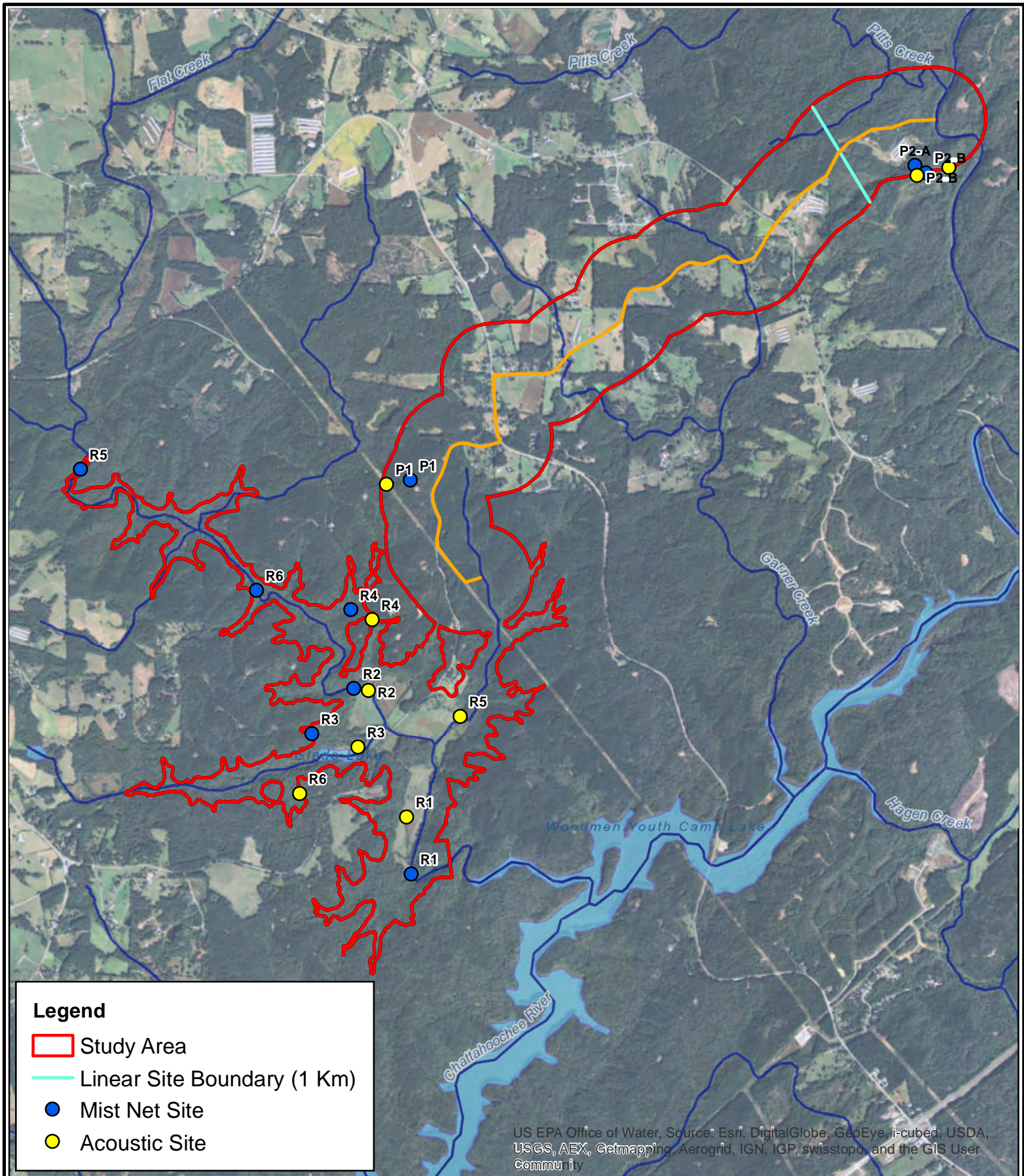
Glades Reservoir Habitat Assessment Map



Drawn by: ABO | Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005



**Proposed Glades Reservoir
Hall County, Georgia**



0 0.5 1 2 Kilometers

Imagery Source: ESRI

FIGURE 6

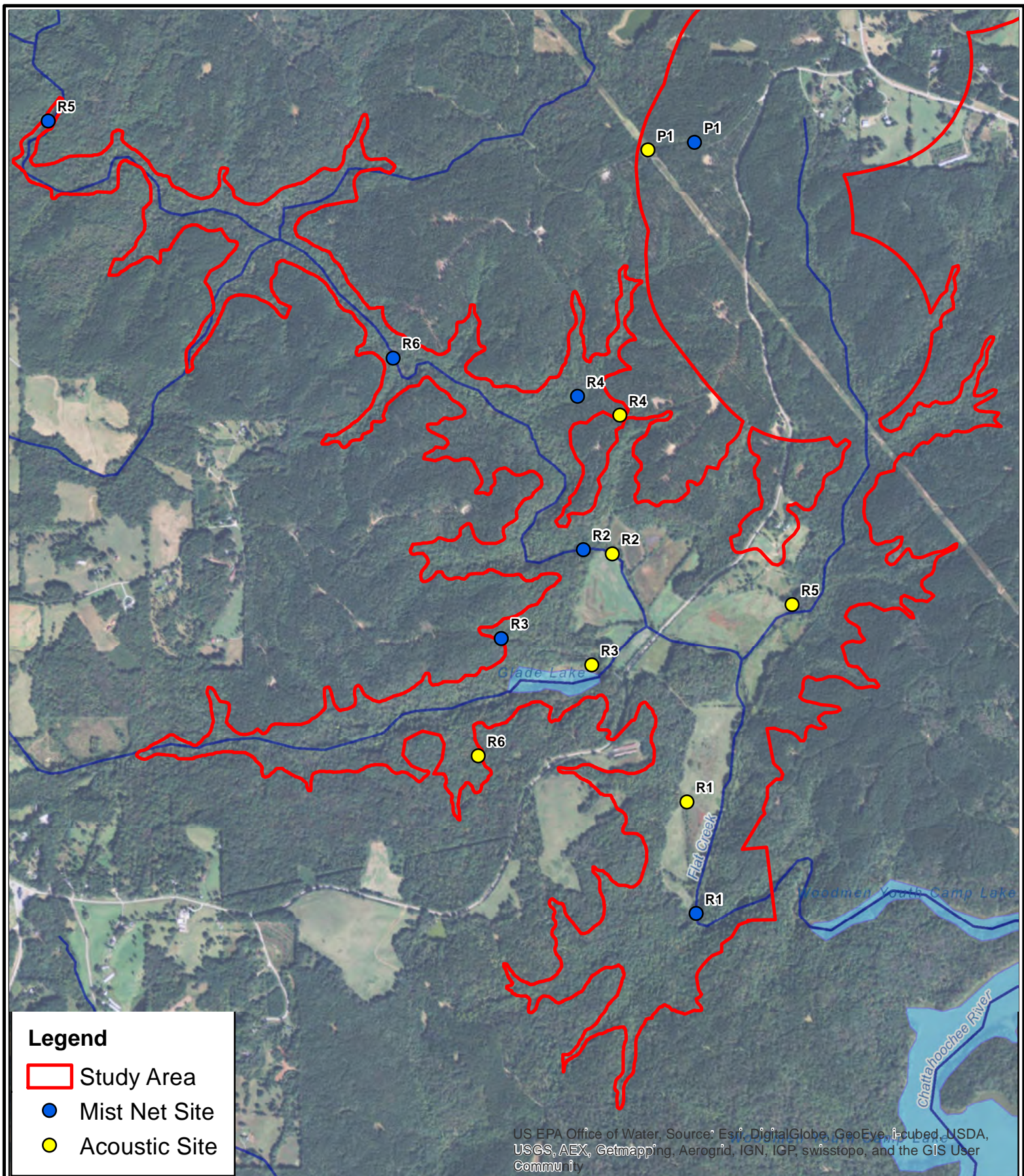
**Glades Reservoir
Survey Overview Map**



Drawn by: ABO | Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005



Legend

- ▭ Study Area
- Mist Net Site
- Acoustic Site

**Proposed Glades Reservoir
Hall County, Georgia**



0 0.375 0.75 1.5 Kilometers

Imagery Source: ESRI

FIGURE 6A

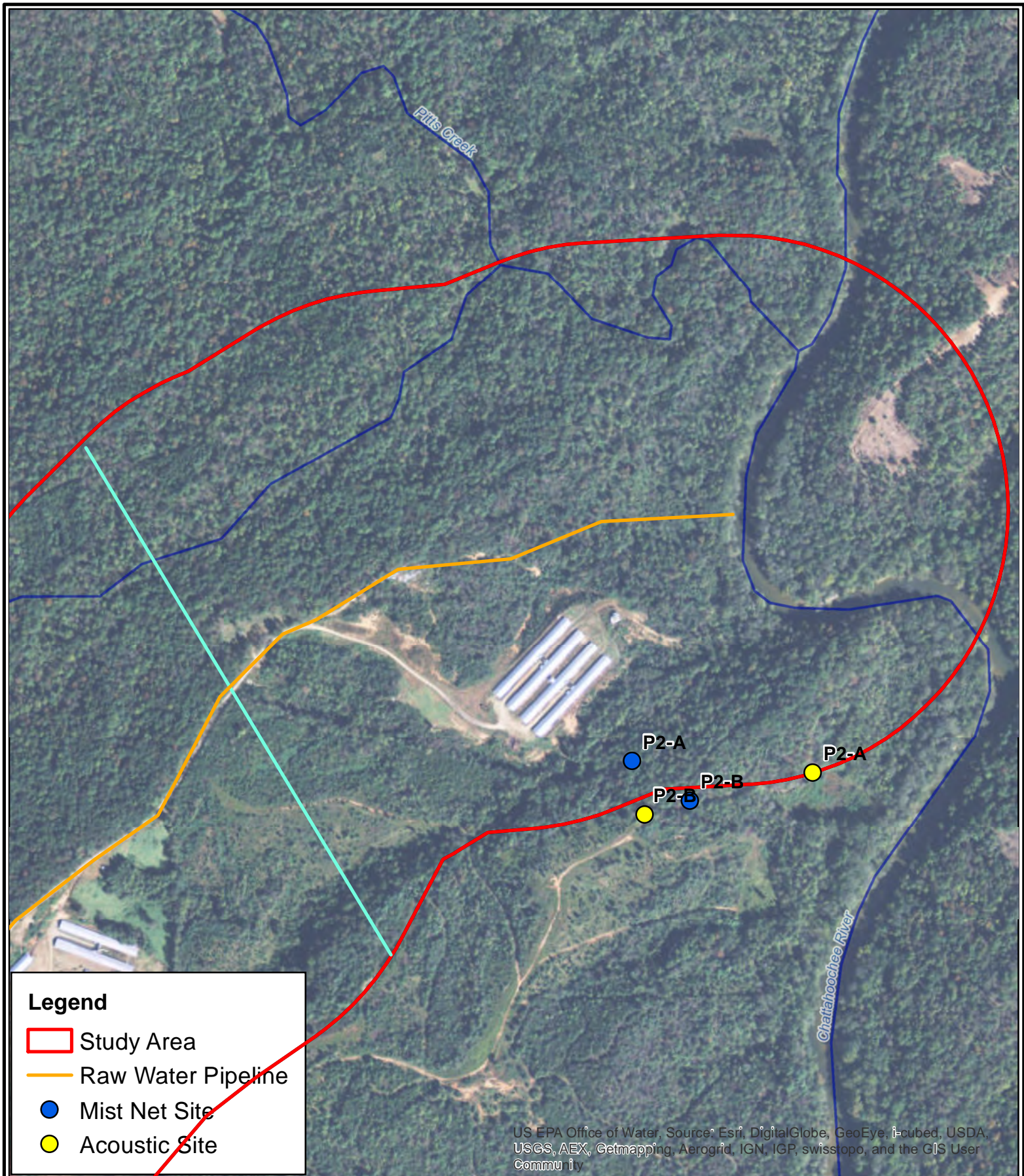
Glades Reservoir Survey Map (R1-R6, P1)



Drawn by: ABO | Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005



**Proposed Glades Reservoir
Hall County, Georgia**



0 0.125 0.25 0.5
Kilometers

Imagery Source: ESRI

FIGURE 6B

**Glades Reservoir
Survey Map (P2)**



Drawn by: ABO Print Date: 8/5/15

For: Hall County BOC

ETC File: MA2015005

M. Photographic Log



Mature Mixed Hardwood Community



Suitable Roost Tree (Snag) in Mature Mixed Hardwood Community



Pine Plantation Community



Mature Hardwood Community



Suitable Roost Tree in Mature Hardwood Community



Bridge over Flat Creek on Glade Farm Rd



Bridge over Flat Creek on Glade Farm Rd



Suitable Roosting Crevice on the Bridge over Flat Creek on Glade Farm Rd



Mist Net Site R1; Net A



Mist Net Site R1; Net B



Mist Net Site R1; Net C



Mist Net Site R2; Net A



Mist Net Site R2; Net B



Mist Net Site R2; Net C



Mist Net Site R3; Net A



Mist Net Site R3; Net B



Mist Net Site R3; Net C



Mist Net Site R4; Net A



Mist Net Site R4; Net B



Mist Net Site R4; Net C



Mist Net Site R5; Net A



Mist Net Site R5; Net B



Mist Net Site R5; Net C



Mist Net Site R6; Net A



Mist Net Site R6; Net B



Mist Net Site R6; Net C



Mist Net P1; Net A



Mist Net Site P1; Net B



Mist Net Site P2; Net A



Mist Net Site P2; Net B



Acoustic Detector Site R1



Acoustic Detector Site R2



Acoustic Detector Site R3



Acoustic Detector Site R4



Acoustic Detector Site R5



Acoustic Detector Site R6



Acoustic Detector Site P1



Acoustic Detector Site P2



Eastern Red Bat (*Lasiurus borealis*)



Big Brown Bat (*Eptesicus fuscus*)



Evening Bat (*Nycticeius humeralis*)

APPENDICES

- Appendix A: Habitat Assessment
- Appendix B: Approved Study Plan and USFWS Correspondence
- Appendix C: Field Data Forms
- Appendix D: Comprehensive Bat Capture Table
- Appendix E: Representative Acoustic Sonograms
- Appendix F: References

Appendix A: Habitat Assessment

APPENDIX A PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): _____
Hardwood

Water Resources at Sample Site			
Stream Type (# and length)	Ephemeral	Intermittent	Perennial
			X
Pools/Ponds (# and size)	Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal	
Describe existing condition of water sources: Flat Creek			

Forest Resources at Sample Site			
Closure/Density	Canopy (> 50%)	Midstory (20-50%)	Understory (<20%)
	4	5	5
Dominant Species of Mature Trees	Q. alba, Q. arborescens, Q. falcata, C. tomentosa C. glabra, L. tulipifera, B. nigra		
% Trees w/ Exfoliating Bark	15%		
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
	25	50	25
No. of Suitable Snags	1		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Suitable for MYSE

Additional Comments:	
HW-A: 34.42326, -83.74284	(Carya snags + Mature Q. alba)
HW-B: 34.42718, -83.74003	HW-F: 34.465542, -83.688940
HW-C: 34.41267, -83.73521	
HW-D: 34.42469, -83.72990	
HW-E: 34.44063, -83.76460	

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

APPENDIX A PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): _____ <div style="text-align: center; font-size: 1.2em;">Mixed Hardwood</div>

Water Resources at Sample Site			
Stream Type (# and length)	Ephemeral	Intermittent	Perennial
Pools/Ponds (# and size)	Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal	
	5		
Describe existing condition of water sources.			

Forest Resources at Sample Site			
Closure/Density	Canopy (> 50%)	Midstory (20-50%)	Understory (<20%)
	4	5	4
Dominant Species of Mature Trees	P. taeda, L. styraciflua, P. serotina		
% Trees w/ Exfoliating Bark	< 5		
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
	35	35	30
No. of Suitable Snags	0		

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Suitable for MYSE

Additional Comments:
MH-A 34.42257, -83.74004
MH-B 34.430928, -83.743426
MH-C 34.439551, -83.750861

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

APPENDIX A PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area
Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description
Sample Site No.(s): _____
Pine Plantation

Water Resources at Sample Site			
Stream Type (# and length)	Ephemeral	Intermittent	Perennial
Pools/Ponds (# and size)	Open and accessible to bats?		
Wetlands (approx. ac.)	Permanent	Seasonal	
Describe existing condition of water sources:			

Forest Resources at Sample Site			
Closure/Density	Canopy (> 50%)	Midstory (20-50%)	Understory (<20%)
Dominant Species of Mature Trees	P. taeda		
% Trees w/ Exfoliating Bark	25	10	0
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)
No. of Suitable Snags	45	45	10

1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Suitable for MYSE

Additional Comments:
PP-A 34.434413 -83.729272
PP-B 34.43153, -83.73825
Pine managed Habitat With small patches of Hardwood dispersed throughout the understory

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations;
understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Appendix B: Approved Study Plan and USFWS Correspondence



STUDY PLAN

BAT MIST NET AND ACOUSTIC SURVEY FOR THE PROPOSED GLADES WATER SUPPLY RESERVOIR, PUMP STATION & RAW WATER PIPELINE HALL COUNTY, GEORGIA

Submitted to: Debbie Harris
U.S. Fish and Wildlife Service
Georgia Ecological Services Field Office
105 Westpark Drive
Westpark Center Suite D
Athens, GA 30606

Date: June 5, 2015

Eco-Tech Consultants (Eco-Tech) has been contracted by the Hall County Board of Commissioners (County) to conduct compliance surveys for the proposed construction of a public drinking water supply reservoir along Flat Creek, pump station at the Chattahoochee River, and raw water pipeline in northern Hall County, Georgia. The project is within the expected range of the federally-endangered Indiana bat (*Myotis sodalis*) and the northern long-eared bat (*M. septentrionalis*), a species recently ruled as threatened under the Endangered Species Act (ESA), effective May 4, 2015. All survey methodologies proposed herein conform to the “2015 Range-wide Indiana Bat Summer Survey Guidelines” (USFWS 2015), which are acceptable for use for northern long-eared bat surveys in 2015, and state-specific guidelines from Georgia Department of Natural Resources (GDNR) and U.S. Fish and Wildlife Service (USFWS) Georgia Field Office. Eco-Tech is submitting this study plan in order to satisfy site-specific authorization requirements for our Federal Fish and Wildlife Permit (No. TE810274-11) and additionally to request written USFWS concurrence on proposed level of effort for the project described below.

1. Project Description

Eco-Tech is requesting USFWS concurrence on proposed bat mist net and acoustic surveys for the following project:

Hall County Board of Commissioners Glades Water Supply Reservoir, Pump Station, & Raw Water Pipelines Hall County, Georgia

The County plans to construct a 3.43 square-kilometer (850 acre) public drinking water supply reservoir at 1,180 feet mean sea level (msl) on Flat Creek in northern Hall County, Georgia (Figure 1). The proposed reservoir will yield a maximum of 72.5 million gallons of water a day when supplemented from raw water delivered from the Chattahoochee River through a proposed, 6.7 kilometer (4.2 mile) pipeline. Project implementation would include the construction of a 0.02 square-kilometer (5 acre) pump station building apron located adjacent to the Chattahoochee River approximately 5 miles upstream of Flat Creek.

2. Determination of Effort

In order to plan mobilization, research needs, staffing, level of effort, and agency/client coordination needs, Eco-Tech biologists have completed a desktop survey of the project area. Survey effort was determined in compliance with the 2015 Range-wide Indiana Bat Summer Survey Guidelines (USFWS 2015), which are acceptable for use for northern long-eared bat surveys in 2015, and survey modifications specific to the state of Georgia (GDNR/USFWS 2015).

The number of required survey sites was determined based on the following parameters:

- ≠ Collection of data on known documentation of Indiana and northern long-eared bats within or near project area.
- ≠ Use of recent aerial photography to identify suitable habitat, in addition to potential mist net and acoustic survey sites. Affected habitat consists largely of any forest resource removal consisting of trees >5" in diameter.
- ≠ For non-linear projects (reservoir pool, dam, & pump station), Indiana bat range-wide USFWS survey guidance (2015) calls for one mist net site to be placed per 0.5 square-kilometer (123 acres) of potential habitat affected by the proposed project. At each site, a minimum of three mist nets are to be monitored for three nights (nine net-nights).
- ≠ For linear projects (pipeline), Indiana bat range-wide USFWS survey guidance (2015) calls for one mist net site to be placed per kilometer of potential habitat affected by the proposed project. Forest patch size, connectivity, stream and travel corridors, and habitat quality are also considered when delineating linear survey sites. At each site, a minimum of two mist nets are to be monitored for two nights (four net-nights).

Using these criteria, the proposed level of effort was determined based on design exhibits using ArcMap 10.2 and results of a preliminary desktop assessment (Figures 2 & 3). A desktop assessment identified 2.89 km² (714 acres) of proposed non-linear forest clearing including 2.84 km² (701.9 acres) within the normal pool, 0.03 km² (7.2 acres) within the dam footprint, and 0.02 km² (5 acres) with the pump station footprint. The pump station is approximately 6 kilometers away from the nearest reservoir forest clearing areas. However, the pump station apron proposed for clearing lies within the linear study area buffer and thus does not warrant an additional non-linear survey site for this Section 7 consultation.

Much of the proposed raw water pipeline route will follow existing right-of-way along Glade Farm Road, Lula Road (State Route 52), and Persimmon Tree Road. Two segments of cross county alignment are proposed resulting in proposed forest clearing activities totaling 1.41 kilometers in length. Proposed level of effort is detailed in Table 1.

Table 1. Proposed Level of Effort for Indiana bat and Northern Long-eared Bat Surveys for Glades Reservoir in Hall County, GA.

Project ID	Location (County)	Description	Project Type	Total Extent	Determined Habitat Area	# Proposed Survey Sites
Glades Reservoir	Hall	Raw Water Pipeline	Linear	6.7 km	1.41 km	2
		Reservoir, Dam, & Pump Station	Non-Linear	3.46 km ²	2.89 km ²	6

3. Survey Methods

The purpose of this survey is to determine the presence or likely-absence of Indiana bats and northern long-eared bats. The USFWS 2015 and state-specific guidelines described previously have been used to develop methodologies for all field activities described below.

3.1. *Mist Net Survey*

The project study area consists of the reservoir pool, dam construction footprint, pump station apron, and a 0.5 kilometer buffer around the proposed pipeline alignment. The study area totals 9.22 km² (2,279 acres) (Figure 4). The mist net sites will be set in the best accessible bat habitat within the study area. Eco-Tech and the County will coordinate landowner access as-needed. Actual mist net placement will be determined while in the field after on-site evaluation of available habitat, flight corridors, water resources, and potential disturbances to the survey process. Surveys will be conducted between May 15 and August 15. Once mist net sites are chosen the following will apply:

- ≠ Non-linear sites will be surveyed for three consecutive calendar nights and during each night three net sets will be erected (nine total “net-nights”).
- ≠ Linear sites will be surveyed for two consecutive calendar nights and during each night two net sets will be erected (4 total “net-nights”).
- ≠ Net sets will be customized for each site and placed approximately perpendicular across flight corridors, filling the corridor from side to side and from the ground or stream bed to the overhanging canopy to completely block the flight corridor. Various combinations of ropes and poles will be used to support the mist nets and will be based on the specific flight corridor height to be covered.
- ≠ The surveys will commence at sunset and last for no less than five hours beginning at dusk.
- ≠ Nets will be checked for bats in 10 minute intervals.
- ≠ Two-person teams will monitor each site.
- ≠ Netting will not take place during nights of continuous rain, cold temperatures (<50F), or heavy wind.
- ≠ Captured bats will be banded, sexed, weighed, aged, have their sexual condition determined, and right forearm length measured. Potential evidence of White Nose Syndrome will be determined using the Reichard Wing Damage Index.
- ≠ Bats will be released, unharmed, at the capture site within 45 minutes of removal from the net.
- ≠ Any federally-listed bat species captured will be documented using close-up digital photographs of the head, calcar, tragus, and toe hairs in order to verify the occurrence.
- ≠ The project team will be notified immediately of any federally-listed bat capture. State agencies and USFWS office will be notified within 24 hours.
- ≠ If fully-volant Indiana bats or female or juvenile northern long-eared bats are captured, Contingency Task A will be implemented
- ≠ All survey crews will adhere to the White Nose Syndrome Decontamination Protocol as set forth by the USFWS Version 06.25.2012 (or the most current version at the time of survey).

3.2. Acoustic Monitoring

Eco-Tech will conduct acoustic sampling concurrent with mist netting. The following methods will be used:

- ≠ One Anabat SD2 acoustic detector will be deployed for each survey site, per state specific guidelines for the state of Georgia (3 detector nights per non-linear site and 2 detector nights per linear site).
- ≠ Acoustic sites will be located at least 100 m from mist netting locations. On-site evaluation of available acoustic sampling sites may result in acoustic sites not being located directly adjacent to mist netting locations.
- ≠ Units will be housed in approved weather-proofing containers.
- ≠ Units will be set in areas that maximize the chances of acoustic detection of the species while minimizing interference from vegetative clutter and debris.
- ≠ Data will be recorded on Compact Flash (CF) cards and analyzed daily to determine appropriate functioning of the units and for documentation of the previous night's bat presence.
- ≠ Data will be analyzed using EchoClass v3.0 automated software. Eco-Tech will tabulate the automated results. Suspected calls of bats in the genus *Myotis* will be further analyzed using qualitative identification methods.
- ≠ If analysis of acoustic data results in the identification of federally-listed bats with a high level of certainty, this information will be immediately coordinated with the project team and USFWS for further guidance.
- ≠ At the completion of each project, acoustic and netting results for each site will be summarized and sent to USFWS for concurrence that the proper level of effort was met and no further sampling would be required.

4. Report of Findings

A comprehensive report of findings will be prepared upon conclusion of all field activities. The report will follow typical scientific format and include the following:

- ≠ Description of the project area and potential habitat.
- ≠ Ecology of the species sought.
- ≠ Field methods used and results of mist net and acoustic surveys.
- ≠ Tables listing all bats captured during the mist netting survey.
- ≠ Assessment, description and comparison of the habitats sampled.
- ≠ Summary of survey and any potential adverse effects to Indiana bats and northern long-eared bats.

5. Contingency Task A – Radio Telemetry Studies

Should any fully-volant Indiana bats or female or juvenile northern long-eared bats be captured, radio-tracking will be initiated. This task includes:

- ≠ The field supervisor will affix a 0.31-0.42g radio transmitter (Holohil Systems LB-2X/2N) to the scapular region of Indiana bats or northern long-eared bats using a surgical skin bonding agent.
- ≠ Per telephone communications with the USFWS' Georgia Ecological Field Office on May 19, 2015 (Pete Pattavina), and June 5, 2015 (Carrie Straight), telemetry requirements for this project are a maximum of two Indiana bats and eight female or juvenile northern long-eared bats. The timing of transmitter distribution will be determined by the best judgement of biologists, but no more than two listed bats of the same species will be radio tagged from the same survey site.
- ≠ Biologists will make a best-judgment decision in applying transmitters to juvenile bats.
- ≠ Daily radio telemetry searches will be employed using scanning and single signal receivers (Wildlife Materials TRX 1000S/2000S). Vehicles will be configured for coarse scale searching with five-element yagi antenna vehicle mounts and coaxial switches. Upon signal location, pedestrian surveys will take place with portable three-element antennas. No properties will be accessed without explicit landowner permission.
- ≠ Radio tracking will be conducted during daylight hours and will continue until the bat(s) is located or for a maximum of 40 hours of ground searching. Additional hardware will be on-hand should fixed-wing aerial surveys be requested.
- ≠ Located bats will be tracked for seven days or 40 receiver hours (whichever comes first), with a minimum of two emergence counts conducted at identified roost trees within this period.
- ≠ Emergence counts will consist of one or two biologists continuously viewing the documented roost tree such that it is silhouetted against the sky for 0.5hr before sunset until 1hr after sunset. Observers will document the number and location of all exiting bats.
- ≠ Datasheets, photos, habitat descriptions, and GPS points will be used to document tracked bats.

6. Tentative Schedule

Biologists will be on-site for approximately two weeks to conduct surveys. We anticipate that surveys will be conducted between June 8 and August 15, 2015.

7. Responsible Parties

The lead researcher will have all agency coordination responsibility and will be supervise the completion of the tasks described herein.

Lead Researcher:	Eco-Tech Consultants, Inc.
USFWS permit:	#TE810274-11
Point of Contact:	Peter Lee Droppelman
POC Email:	ldroppelman@ecotechinc.com
POC Phone:	502-548-0960 (mobile)

We request emailed/written concurrence that your agency finds this study plan to contain sufficient level of effort and methodology for the project as described. Concurrence and/or technical questions should be transmitted to the Point of Contact above.

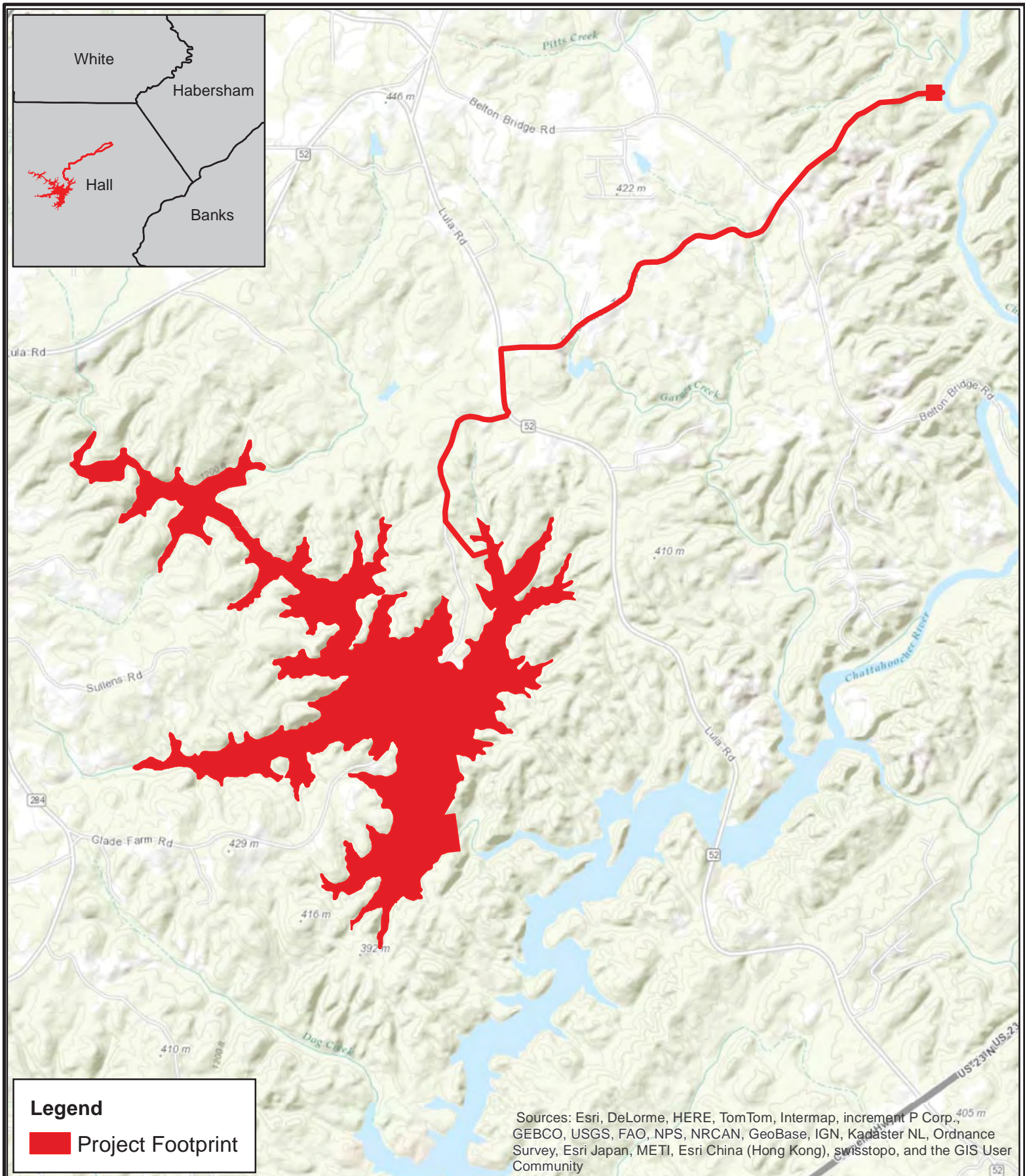
Sincerely,



Peter "Lee" Droppelman
President/Principal Scientist
Eco-Tech Consultants, Inc.

Cc via email:

Carrie Straight, USFWS
Pete Pattavina, USFWS
Katrina Morris, GADNR
Ken Rearden, Hall County
Harold Reheis, Joe Tanner & Associates
Alton Owens, Eco-Tech Consultants, Inc.
Laci Coleman, Eco-Tech Consultants, Inc.



**Proposed Glades Reservoir
Hall County, Georgia**



0 0.5 1 2 Kilometers

Imagery Source: ESRI

FIGURE 1

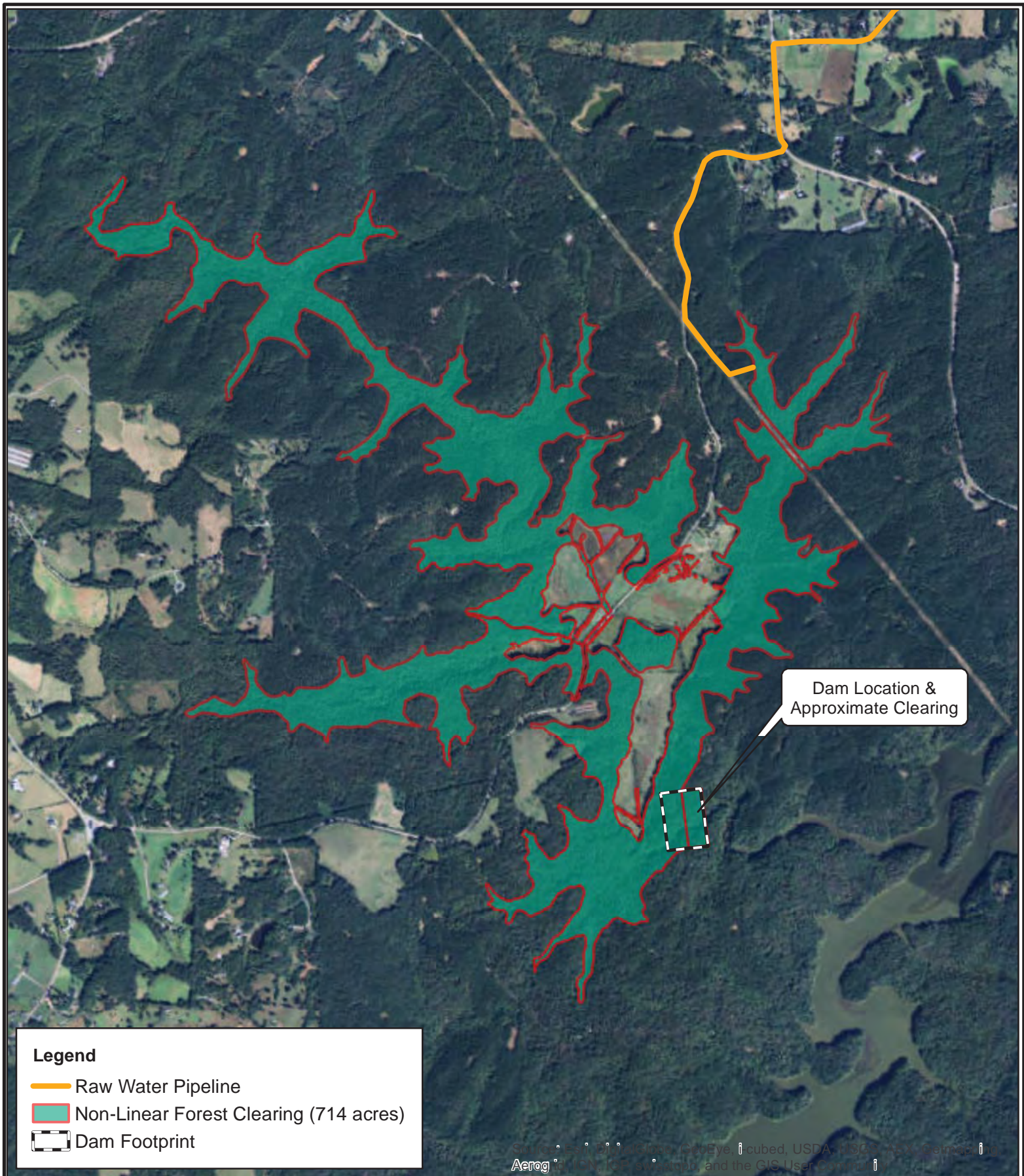
**Glades Reservoir
Project Location Map**



Drawn by: ABO | Print Date: 6/5/15

For: Hall County BOC

ETC File: MA2015005



**Proposed Glades Reservoir
Hall County, Georgia**



0 0.45 0.9 1.8 Kilometers

Imagery Source: ESRI

FIGURE 2

Glades Reservoir Non-Linear Forest Clearing Map



Drawn by: ABO Print Date: 6/5/15

For: Hall County BOC

ETC File: MA2015005

Legend

- Reservoir Pool @ 1180' msl
- Raw Water Pipeline
- Non-Linear Forest Clearing (0.02 sq km)
- Linear Forest Clearing (1.41 km)

Non-Linear Forest Clearing
(Pump Station Apron)
0.02 square km

Linear Forest Clearing
1.29 km

Linear Forest Clearing
0.12 km

Source: ESRI, Google Earth, i-cubed, USDA, USGS, AEX, Getmapping,
Aerog, IGN, SPP, Swisstopo, and the GIS User Community

Proposed Glades Reservoir
Hall County, Georgia



0 0.425 0.85 1.7 Kilometers

Imagery Source: ESRI

FIGURE 3

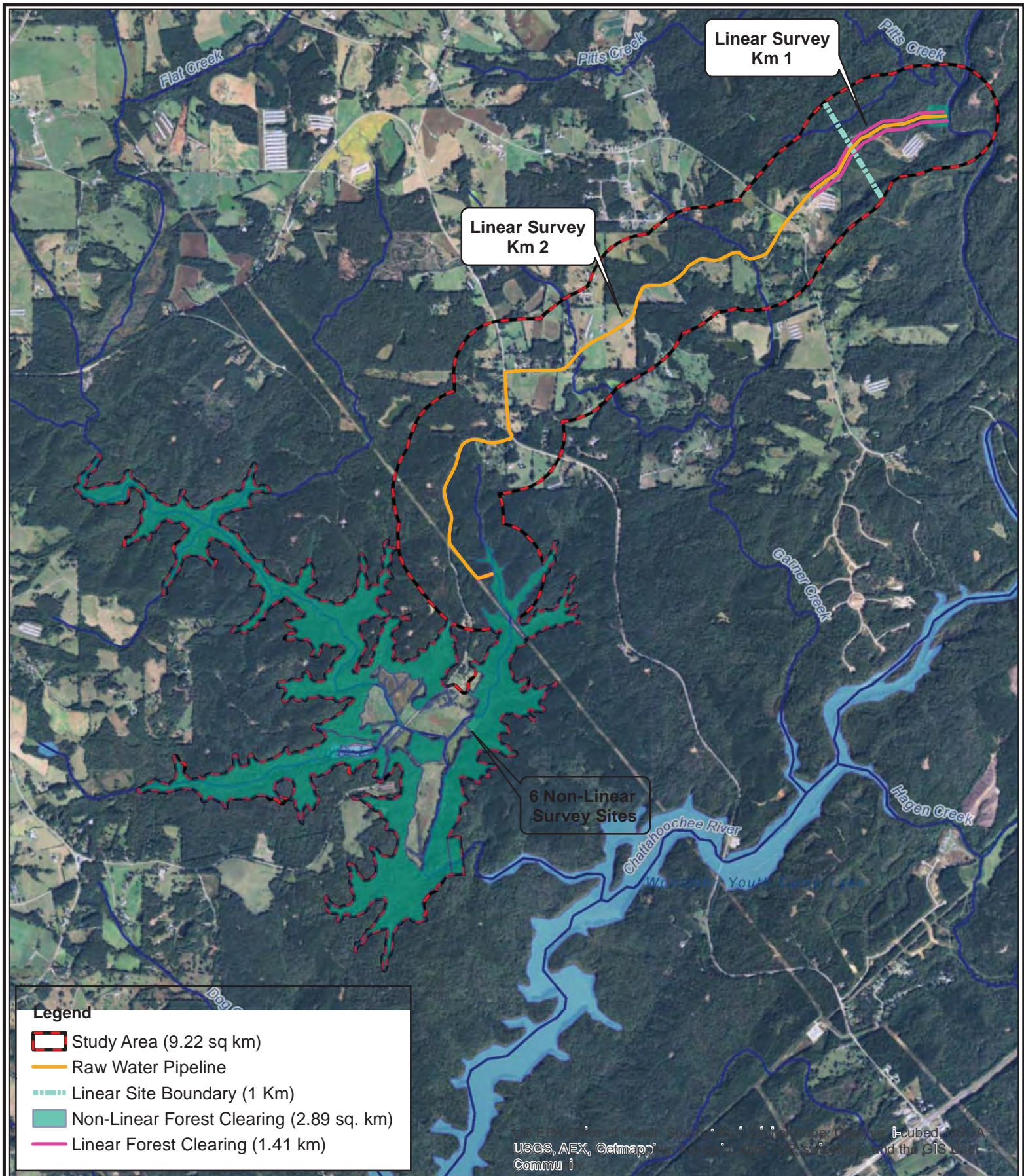
Glades Reservoir Pipeline & Pump Station Clearing Map



Drawn by: ABO | Print Date: 6/5/15

For: Hall County BOC

ETC File: MA2015005



**Proposed Glades Reservoir
Hall County, Georgia**



0 0.5 1 2 Kilometers

Imagery Source: ESRI

FIGURE 4

**Glades Reservoir
Bat Study Area Map**



Drawn by: ABO Print Date: 6/5/15

For: Hall County BOC

ETC File: MA2015005

From: [Straight, Carrie](#)
To: [Alton Owens](#)
Cc: debbie_harris@fws.gov; [Pattavina, Pete](#); [Katrina Morris \(Katrina.Morris@dnr.state.ga.us\)](mailto:Katrina.Morris@dnr.state.ga.us); [Kenneth Rearden \(Public Works\)](#); [Harold Reheis](#); [Lee Droppelman](#); [Laci Coleman](#)
Subject: Re: Glades Reservoir Bat Survey Study Plan
Date: Tuesday, June 09, 2015 10:13:43 AM

Alton,

I reviewed the referenced bat survey plan. The plan conforms to our Georgia Bat Survey Guidance and/or with negotiations with GDOT and USFWS during project planning. I believe the plan will collect sufficient information to determine the project's effects. I have no suggested additions or modifications to the plan. Thank you for the opportunity to provide comments.

Carrie

<°)))))< <°)))))< <°)))))< <°)))))< <°)))))<

Carrie A. Straight, PhD
Fish and Wildlife Biologist
U.S. Fish & Wildlife Service
Georgia Ecological Services
105 Westpark Drive, Suite D
Athens, GA 30606
706.613.9493 x226
Fax 706.613.6059

On Fri, Jun 5, 2015 at 5:07 PM, Alton Owens <AOWens@ecotechinc.com> wrote:

Ms. Straight,

Please find attached a study plan for proposed bat surveys at the Glades Reservoir, Pump Station, and Raw Water Pipeline in Hall County. A 3.43-square kilometer water supply reservoir and 6.7 kilometer raw water pipeline is proposed. Within this footprint, 2.89 square kilometers of suitable non-linear habitat and 1.41 kilometers of linear habitat for the Indiana bat and northern long-eared bat have been identified by a desktop analysis.

We are proposing a survey level-of-effort consistent with 2015 USFWS guidelines for these species and comprised of 6 non-linear survey sites with 9 net sets per site (54 total net nights) and 2 linear survey sites with 4 net sets per site (8 total net nights). Additionally, as requested, we will conduct acoustic monitoring at survey sites over each sample night (22 monitoring nights) in habitats not easily sampled with traditional mist net sets. Acoustic data will initially be analyzed using Echoclass v3.0 software. Any identified *Myotis* files will be confirmed qualitatively and tabulated.

All mist net and acoustic results (and telemetry if needed) will be coordinated with your office while biologists are mobilized at the site. We expect to begin survey activities as soon as possible upon receipt of site-specific level-of-effort concurrence from your office. If you agree the proposed effort as described in the attached study plan is sufficient to

satisfy Section 7 obligations, please direct your concurrence via hardcopy and/or email to my attention.

Should you have any questions or concerns please feel free to contact me anytime day or night using the information below. Thanks in advance for your consideration and we look forward to your response.

Alton Owens

Alton B. Owens

Senior Ecologist

Eco-Tech Consultants, Inc.

1220 Kennestone Circle, Suite 100

Marietta, GA 30066

office: 678.496.3745

mobile: 770.286.8974

facsimile: 678.496.3739

aowens@ecotechinc.com

www.ecotechinc.com

Appendix C: Field Data Forms

NET SITE DESCRIPTION

SITE: R1 PROJECT: GLADES RESERVOIR DATES: 6/11/16 - 6/18/18

ID BY: ZACK COUCH QUAD: _____ COUNTY: HALL STATE: GA

Net A Width (m): 6.0 Height (m): 5.2 Lat/Long: 34.41434, -83.73481

Net B Width (m): 6.0 Height (m): 5.2 Lat/Long: 34.41351, -83.73466

Net C Width (m): 6.0 Height (m): 5.2 Lat/Long: 34.41306, -83.73465

Net D Width (m): _____ Height (m): _____ Lat/Long: _____

Anabat Lat/Long: 34.41735, -83.73508

Anabat Lat/Long: _____

VEGETATION

Dominant Canopy Species:

- 1) ACER NEGUNDO
- 2) JUGLANS NIGRA
- 3) LIRIODENDRON TULIPIFERA

Percent Canopy Closure:

Net A 90 Net C 100%

Net B 95 Net D _____

Average Canopy DBH (cm):

14-18"

Dominant Understory Species:

- 1) ACER RUBRUM
- 2) CARPINUS CAROLINIANA
- 3) FRAXINUS PENNSYLVANICA

Understory Density:

Very Dense LEFT BANK ☒

Moderate _____ ☐

Clear RIGHT BANK ☒

Average Understory DBH (cm):

4"

STREAM NAME:

Bank Height (m): 2.5

Channel Width (m): 9.0

Water Width (m): 8.0

Average Water Depth (m):

0.2

Dominant Substrate:

COBBLE/SAND

Turbidity (clear/cloudy):

CLOUDY

CATTLE HOOF SKEER, ERODING RIGHT BANK, SEVERAL IMPAIRED TRIBUTARIES

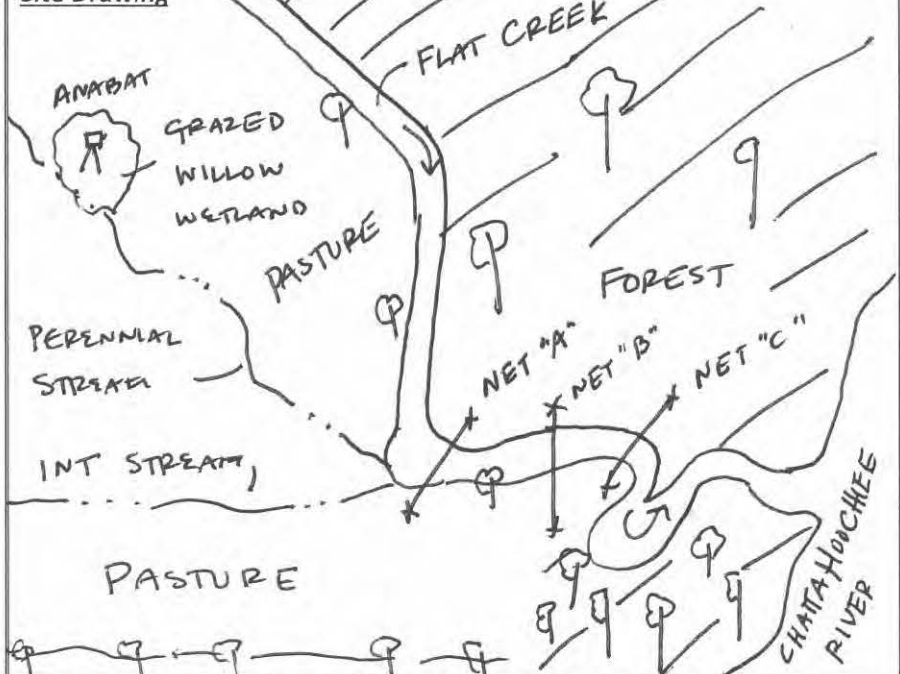
Comments/Descriptions

ALL NETS ARE DOUBLE "6's"
ON FLAT CREEK. CATTLE
GRAZING ALONG RIGHT BANK
HAS LED TO BANK + TREE
FAILURE RESULTING IN A
SOMEWHAT CLUTTERED
CORRIDOR. CONDITIONS IN
DOWNSTREAM REACH WHERE
BOTH BANKS ARE FULLY
FORESTED ARE WORSE FOR
MIST NETTING

NET "A" @ BEND IN CREEK NEAR
CONFLUENCE OF 2 1ST ORDER
STREAMS - UNDER STREAM BEDS

NET "B" @ SLOW POOL
JUST BEFORE STREAM

Site Drawing



FLOWS INTO FORESTED CORRIDOR.

NET "C" IS WITHIN CORRIDOR JUST BEFORE DOWNED VEGETATION CHOKES
OUT STREAM @ TAIL END OF COBBLE RIFFLE + ABOVE POOL.

BAT CAPTURE DATA FORM


PROJECT: GLADES RESERVOIR

FLAT CREEK NEAR DAM PROPOSED FOOTPRINT

SITE: P1

INVESTIGATORS: ZACK COUCH

DATE: 6-16-15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)			
	MISTNET START	2100	80	75	N	0 1 2 3 4 5 6	0 1 2 3 4		
	MISTNET END	0200	78	94	N	0 1 2 3 4 5 6	0 1 2 3 4		
LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent						RISE (24 HR)	SET (24 HR)	
							MOON	2050	0729
							SUN	0622	2049

COMMENTS AND OTHER WILDLIFE NOTED:

WATER THRUSH (5) IN NET C


ROSTER NOT CALIBRATED
(+9mm)
- 2-3mm

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. LABU	B	2110	0.5	A	F	L	145	47	0		
2. LABU	B	2135	1.0	A	M	NR	13.5	46	0		
3. EPFU	C	2140	2.0	A	F	L	22.25	51	0		
4. NYHU	C	2200	3.5	A	M	NR	10.0	35	0		
5. EPFU	B	2240	1.45	A	F	P	22.5	52	0		
6. LABU	B	2253	2.5	A	F	L	16.5	48	0		
7. EPFU	C	2354	4.5	A	F	ESCAPED					
8. EPFU	B	0032	3.5	A	F	L	20.5	48	0		
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

BAT CAPTURE DATA FORM

PROJECT: GLADES RESERVOIRSITE: R1INVESTIGATORS: ZACK COUCH + AERN OWENSDATE: 6/17

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)	
	MISTNET START	2100	78	88	N	0 1 2 3 4 5 6	
MISTNET END	0200	73	97	Y	0 1 2 3 4 5 6	0 1 2 3 4	
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous					RISE (24 HR)	SET (24 HR)
	Full moon Waning gibbous Third quarter Waning crescent <u>2.5</u> %					MOON	2141
						SUN	0622 2049


COMMENTS AND OTHER WILDLIFE NOTED:

High Insect ActivityBAT #22nd 3rd
TORN MEMBRANE BETWEEN 1st + 2nd Digit

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. EPFU	C	2155	2.5	A	F	L	19.5	47.0	0		
2. EPFU	A	2159	0.5	A	F	L	19.0	45.0	1(?)		
3. EPFU	B	2212	1.5	A	F	L	21.75	47.0	0		
4. LABO	B	2314	0.5	A	F	L	16.5	39.0	0		
5. LABO	B	2331	0.5	A	M	TD	15.5	39.0	0		
6. EPFU	C	0000	3.0	A	F	L	19.5	47.0	0		
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

BAT CAPTURE DATA FORM

PROJECT: <u>GLADES RESERVOIR</u> <u>MA2015</u>																	
SITE: <u>R1</u>		INVESTIGATORS: <u>ZACK</u>				DATE: <u>6/18/2015</u>											
	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>						
	MISTNET START <u>2045</u>	<u>72</u>	<u>88</u>	<u>N</u>	0	1	2	3	4	5	6	0	1	2	3	4	
MISTNET END	<u>2145</u>	<u>68</u>	<u>100</u>	<u>N</u>	0	1	2	3	4	5	6	0	1	2	3	4	
LUNAR PHASE & % ILLUMINATION		New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>6.8</u> %										RISE (24 HR)		SET (24 HR)			
												MOON		<u>0827</u>		<u>2228</u>	
												SUN		<u>0623</u>		<u>2049</u>	
COMMENTS AND OTHER WILDLIFE NOTED: <u>THIRD & FINAL NIGHT, STORM SYSTEM SOUTH OF PROJECT OVER LAKE LANIER</u>																	

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. LABO	C	2140	1.5	A	F	L	14.75	41	0		
2. EPFU	C	2255	2.5	A	F	L	24.5	46	0		
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

NET SITE DESCRIPTION

SITE: B2 PROJECT: MA2015005 Glades DATES: 6/15 - 6/17

ID BY: Craig Blane QUAD: _____ COUNTY: Hall STATE: GA

Net A Width (m): 9 Height (m): 5 Lat/Long: 34.42665 -83.73970

Net B Width (m): 9 Height (m): 5 Lat/Long: 34.42647 -83.74078

Net C Width (m): 6 Height (m): 5 Lat/Long: 34.42651 -83.74093

Net D Width (m): _____ Height (m): _____ Lat/Long: _____

Anabat Lat/Long: _____

Anabat Lat/Long: _____

VEGETATION

Dominant Canopy Species:

1) Q. nigra

2) B. nigra

3) P. occidentalis

Percent Canopy Closure:

Net A 50% Net C 85

Net B 85 Net D _____

Average Canopy DBH (cm):

18-20

Dominant Understory Species:

1) C. caroliniana

2) B. nigra

3) _____

Understory Density:

Very Dense

Moderate

Clear

Average Understory DBH (cm):

4-6

STREAM NAME: Flat Creek

Bank Height (m): 0.5 m

Channel Width (m): 9 m

Water Width (m): 8.5 m

Average Water Depth (m): 1 Foot

Dominant Substrate: Sand / cobble

Turbidity (clear/cloudy): Clear

Comments/Descriptions

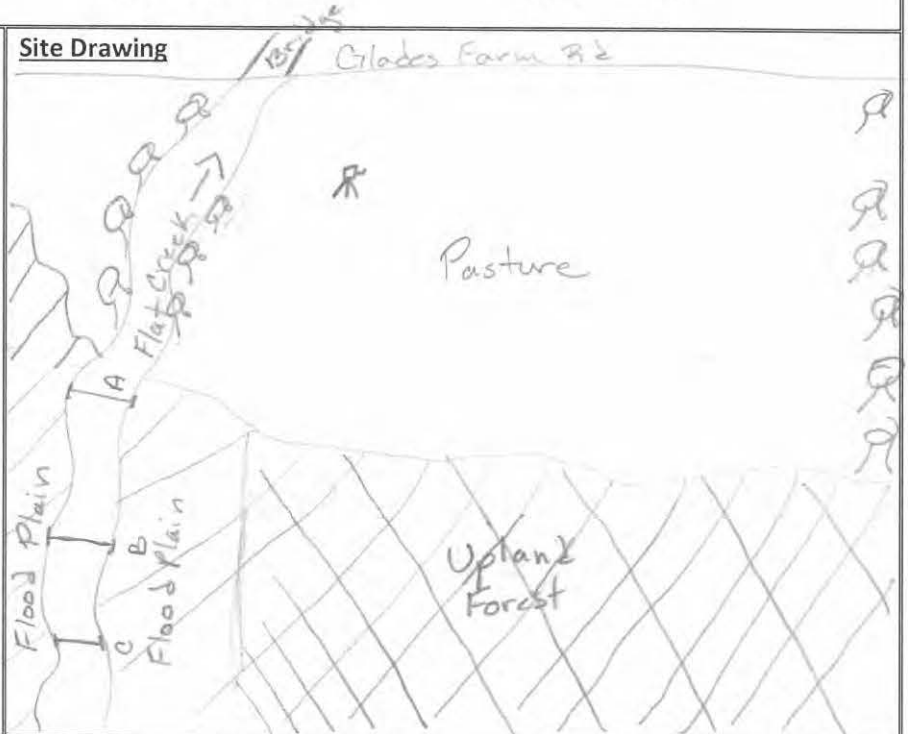
Moderate - High maternity
Habitat w/ mature hardwoods
+ snags throughout Flood
plain + surrounding Forest

Anabat was in the pasture.

Mature Oak w/
sloughing bark.

The pasture appears to
have been sprayed
recently.

Site Drawing




BAT CAPTURE DATA FORM

PROJECT: GRADES RESERVOIR - HALL COUNTY

FLAT CREEK

SITE: R2 INVESTIGATORS: CRAIG BLAND & ALTON OWENS DATE: 6/15/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)							
MISTNET START	20:45	75	89	N	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4						
MISTNET END	1:45	71.2	74.1	N	0 1 2 3 4 5 6	0 1 2 3 4 5 6	0 1 2 3 4						
LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent												
	MOON 2048 6:35												
	SUN 0622 2049												


COMMENTS AND OTHER WILDLIFE NOTED:

LABO FLYING AROUND NET "A" @ 21:20

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. LABO	A	8:45	0.1	A	F	L	12.6	44	0		
2. LABO	A	21:30	3	Escaped							
3. LABO	B	21:30	0.5	A	M	NR	12.5	43	0		
4. EPFU	A	21:45	2.5	A	F	L	18	46	0		
5. LABO	A	22:15	0.5	A	M	NR	12.0	42	0		
6. EPFU	A	22:30	1.5	A	F	P	20.5	47	0		
7. EPFU	A	22:45	3.5	A	F	P	20	47	0		
8. EPFU	A	23:15	5	A	F	P	21.5	49	0P		
9. EPFU	A	23:15	1	A	F	P	19.5	49	0		
10. EPFU	A	23:50	4.5	A	F	P	- ESCAPED -				
11. EPFU	A	01:00	0.25	A	F	P	22	48	0		
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female


BAT CAPTURE DATA FORM

PROJECT: <i>Glades MAZ015005</i>																
SITE: <i>R2</i>		INVESTIGATORS: <i>Craig Bland + Matthew Baggett</i>				DATE: <i>6/16/15</i>										
	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>					
	MISTNET START	<i>2045</i>	<i>77</i>	<i>87.8</i>	<i>N</i>	0	①	2	3	4	5	6	①	1	2	3
MISTNET END	<i>0145</i>	<i>70</i>	<i>99.1</i>	<i>N</i>	①	1	2	3	4	5	6	①	1	2	3	4
LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <i>0.4%</i>											RISE (24 HR)		SET (24 HR)		
												MOON		<i>2050</i>		<i>0729</i>
	SUN		<i>0622</i>		<i>2049</i>											
COMMENTS AND OTHER WILDLIFE NOTED:																

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. <i>LABO</i>	<i>A</i>	<i>2045</i>	<i>0.25</i>	<i>A</i>	<i>F</i>	<i>L</i>		<i>42</i>	<i>0</i>		
2. <i>EPFU</i>	<i>A</i>	<i>2145</i>	<i>1</i>	<i>A</i>	<i>F</i>	<i>P</i>	<i>18</i>	<i>46</i>	<i>0</i>		
3. <i>EPFU</i>	<i>A</i>	<i>0145</i>	<i>0.25</i>	<i>A</i>	<i>F</i>	<i>P</i>	<i>22</i>	<i>47</i>	<i>0</i>		
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

BAT CAPTURE DATA FORM

PROJECT: <u>Glades Farm MA2015005</u>																	
SITE: <u>R2</u> INVESTIGATORS: <u>Craig Bland, Matthew Baggott</u> DATE: <u>6/17/2015</u>																	
	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>						
	MISTNET START	<u>2045</u>	<u>78</u>	<u>88.0</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
MISTNET END	<u>0150</u>	<u>70.7</u>	<u>99.7</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>2.6</u> %											RISE (24 HR)		SET (24 HR)			
												MOON		<u>7:32 AM</u>		<u>7:45 PM</u>	
												SUN		<u>0622</u>		<u>2049</u>	
COMMENTS AND OTHER WILDLIFE NOTED: <u>Raccoon (Procyon lotor)</u> <u>Banded water snake (Nerodia)</u> <u>Coyote</u> <u>Leopard frog, Coastal plains (Lithobates sphenoccephalus ultracalvus)</u> <u>N. Cricket frog (Acris crepitans)</u> <u>Bronze frog (Lithobates clamitans)</u>																	

	Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.	LABO	A	2050	1	A	F	LAC	13	43	P		
2.	LABO	A	2050	1	A	F	L	Released from net				
3.	LABO	B	2150	1	A	M	NS	12	37	0		
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												
13.												
14.												
15.												

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

NET SITE DESCRIPTION

SITE: R3 PROJECT: GLADES RESERVE DATES: 6/13

ID BY: ZACH COUCH QUAD: _____ COUNTY: HALL STATE: GA

Net A Width (m): 4 Height (m): _____ Lat/Long: 34.42286, -83.74181

Net B Width (m): 6 Height (m): _____ Lat/Long: 34.42295, -83.74218

Net C Width (m): 4 Height (m): _____ Lat/Long: 34.42307, -83.74246

Net D Width (m): _____ Height (m): _____ Lat/Long: _____

Anabat Lat/Long: 34.42194, -83.74015

Anabat Lat/Long: _____

VEGETATION

Dominant Canopy Species:

1) Q. alba

2) Q. nigra

3) C. glabra

L. tulipifera

Dominant Understory Species:

1) P. serotina

2) P. echinata

3) O. virginica

Percent Canopy Closure:

Net A 90% Net C 95%

Net B 80% Net D _____

Average Canopy DBH (cm):

18-20"

Understory Density:

Very Dense ☐

Moderate - Low ☒

Clear ☐

Average Understory DBH (cm):

6-8

STREAM NAME:

Bank Height (m): _____ **Average Water Depth (m):** _____

Channel Width (m): _____ **Dominant Substrate:** _____

Water Width (m): _____ **Turbidity (clear/cloudy):** _____

Comments/Descriptions

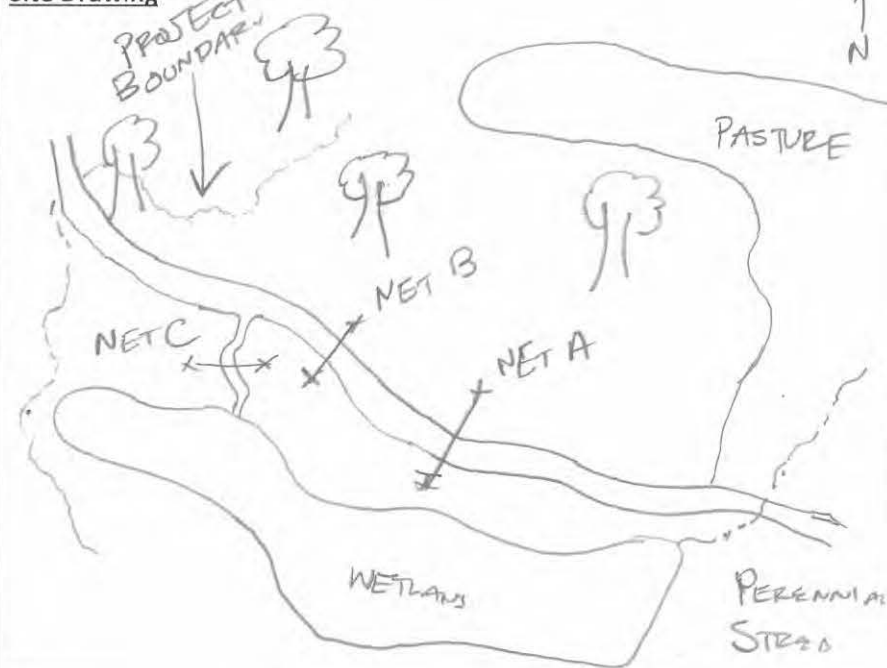
Ridge line forest road along mid-successional oak hickory forest between 5-10 acre emergent wetland.

NET A + NET B ALONG ROAD. NET C ALONG OLD ROADBED THAT CONNECTS FOREST ROAD TO WETLAND


LARGE PASTURE NEAR JUNCTION OF ROAD + STREAM

ALL NETS DOUBLE

Site Drawing




BAT CAPTURE DATA FORM

PROJECT: GLADES PUBLIC WATER SUPPLY RESERVOIR																	
SITE: R3		INVESTIGATORS: ZACH COUCH, MATTHEW BARTOT, ALTON OWENS DATE: 6/13															
 Eco-Tech CONSULTANTS	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>						
	MISTNET START	21:00	86°	75	N	0	1	2	3	4	5	6	0	1	2	3	4
	MISTNET END	2:00	75	89	N	0	1	2	3	4	5	6	0	1	2	3	4
LUNAR PHASE & % ILLUMINATION		New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter <u>Waning crescent</u> 7.8 %															
		RISE (24 HR)		SET (24 HR)													
		MOON		SUN													
COMMENTS AND OTHER WILDLIFE NOTED: <i>Hyla cinerea</i> <i>Lasiurus borealis</i> flying on road																	


Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. EPFU	B	22:35	1.5	A	F	P	24.25	49	0		
2. EPFU	B	1:45	2	A	F	P	23	47	0		
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

BAT CAPTURE DATA FORM

PROJECT: <i>Glades Res</i>																
SITE: <i>R3</i>			INVESTIGATORS: <i>Z. Couch</i>				DATE: <i>6/14/15</i>									
 Eco-Tech CONSULTANTS	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>					
	MISTNET START	<i>20:50</i>	<i>88</i>	<i>70</i>	<i>N</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>
MISTNET END	<i>2:00</i>	<i>76</i>	<i>70</i>	<i>N</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <i>8</i> %											RISE (24 HR)		SET (24 HR)		
												MOON		<i>0457</i>		<i>1457</i>
	SUN		<i>0622</i>		<i>2048</i>											
COMMENTS AND OTHER WILDLIFE NOTED:																

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. <i>EPFu</i>	<i>B</i>	<i>22:45</i>	<i>1.5</i>	<i>A</i>	<i>F</i>	<i>Lac</i>	<i>23.5</i>	<i>46</i>	<i>0</i>		
2. <i>EPFu</i>	<i>A</i>	<i>23:59</i>	<i>4m</i>	<i>A</i>	<i>F</i>	<i>Lac</i>	<i>21</i>	<i>46</i>	<i>0</i>		
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

BAT CAPTURE DATA FORM

PROJECT: <i>Glades Res</i>																	
SITE: <i>R3</i>		INVESTIGATORS: <i>Z. Conrad</i>				DATE: <i>6/15/15</i>											
 Eco-Tech CONSULTANTS	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>						
	MISTNET START	<i>21:00</i>	<i>84</i>	<i>70</i>	<i>N</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
MISTNET END	<i>02:00</i>	<i>76</i>	<i>60</i>	<i>N</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	
LUNAR PHASE & % ILLUMINATION		New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <i>4%</i>										RISE (24 HR)		SET (24 HR)			
												MOON		<i>0545</i>		<i>1957</i>	
		SUN		<i>0622</i>		<i>2049</i>											
COMMENTS AND OTHER WILDLIFE NOTED:																	

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended **Age:** A: adult; J: juvenile **Sex:** M: male; F: female

NET SITE DESCRIPTION

SITE: R4 PROJECT: Glades MA7015005 DATES: 6/18/15 - 6/20/15

ID BY: Craig Bland, M. Baggott QUAD: _____ COUNTY: Hall STATE: GA

Net A	Width (m): <u>6</u>	Height (m): <u>5</u>	Lat/Long: <u>34.43208 -83.73898</u>
Net B	Width (m): <u>4</u>	Height (m): <u>5</u>	Lat/Long: <u>34.43260 -83.73957</u>
Net C	Width (m): <u>4</u>	Height (m): <u>5</u>	Lat/Long: <u>34.43311 -83.73981</u>
Net D	Width (m): _____	Height (m): _____	Lat/Long: _____
Anabat	Lat/Long: _____		
Anabat	Lat/Long: _____		

VEGETATION

Dominant Canopy Species:	Percent Canopy Closure:	Average Canopy DBH (cm):
1) <u>P. taeda</u>	Net A <u>55</u> Net C <u>80</u>	<u>18 inches</u>
2) <u>L. tulipifera</u>	Net B <u>80</u> Net D _____	
3) <u>Q. alba</u>		
Dominant Understory Species:	Understory Density:	Average Understory DBH (cm):
1) <u>L. tulipifera</u>	Very Dense <input type="checkbox"/>	<u>5</u>
2) <u>Q. alba</u>	Moderate <input checked="" type="checkbox"/>	
3) _____	Clear <input type="checkbox"/>	

STREAM NAME:

Bank Height (m): <u>0.2</u>	Average Water Depth (m): <u>0.05</u>
Channel Width (m): <u>2</u>	Dominant Substrate: <u>sand</u>
Water Width (m): <u>1</u>	Turbidity (clear/cloudy): <u>clear</u>

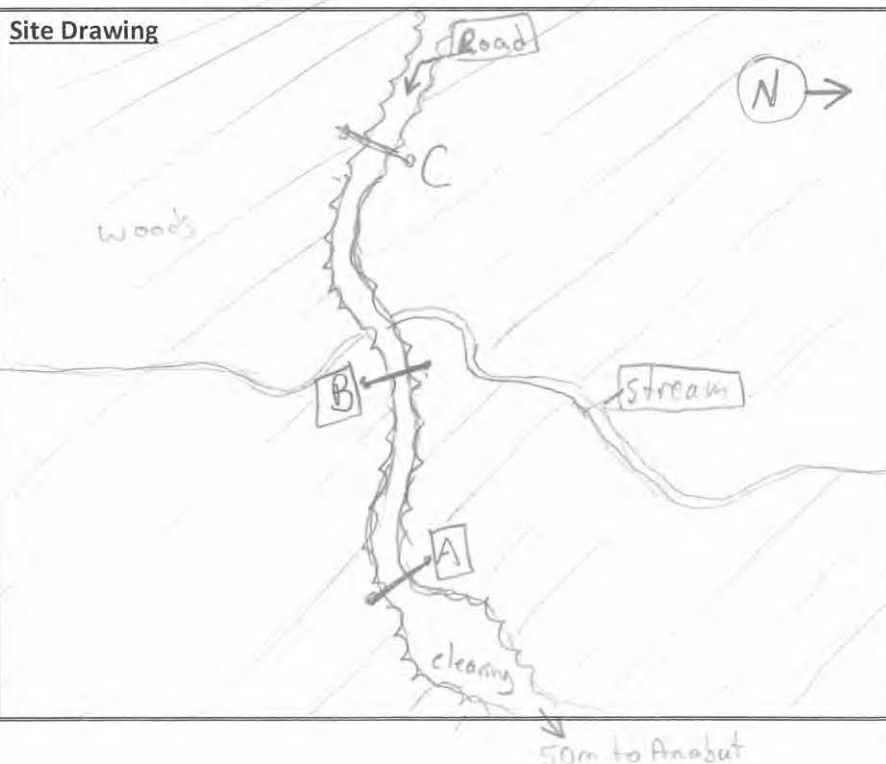
Comments/Descriptions

Moderate maturity Habitat w/ mature hardwoods + some snags throughout forest.


Net A is near the transition point to pine management area towards ridge tops.

Nets B + C are in Hardwood stand running along the unnamed tributary

Site Drawing




BAT CAPTURE DATA FORM

PROJECT: <u>Glades MA2015005</u>																	
SITE: <u>R4</u> INVESTIGATORS: <u>Craig Bland, Matthew Baggott</u> DATE: <u>6/18/15</u>																	
	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>						
	MISTNET START	<u>2055</u>	<u>72.9</u>	<u>96.3</u>	<u>N</u>	0	1	2	3	4	5	6	0	1	2	3	4
MISTNET END	<u>0155</u>	<u>68.1</u>	<u>100</u>	<u>N</u>	0	1	2	3	4	5	6	0	1	2	3	4	
LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>68%</u>											RISE (24 HR)		SET (24 HR)			
												MOON		<u>0827</u>		<u>2228</u>	
	SUN		<u>0623</u>		<u>2049</u>												
COMMENTS AND OTHER WILDLIFE NOTED: <u>Chuck willis widow</u> <u>Great horned owl</u>																	

	Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.	LABO	C	0100	2	A	F	L	14	41	0		
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												
13.												
14.												
15.												

BAT CAPTURE DATA FORM

PROJECT: Glades MA2015005																	
SITE: R4		INVESTIGATORS: Craig Bland, Matthew Baggott					DATE: 6/19/15										
 Eco-Tech CONSULTANTS	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>						
	MISTNET START	2055	77	85.3	N	0	1	2	3	4	5	6	0	1	2	3	4
	MISTNET END	0155	68.2	100	N	0	1	2	3	4	5	6	0	1	2	3	4
LUNAR PHASE & % ILLUMINATION		New moon <u>Waxing crescent</u> First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>12.7%</u>										RISE (24 HR)		SET (24 HR)			
												MOON		0924		2309	
												SUN		0622		2049	
COMMENTS AND OTHER WILDLIFE NOTED:																	
Chuck willow's widow Gray tree frog (<i>Hyla chrysoscelis</i>)																	

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.	NO CAPTURES										
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

BAT CAPTURE DATA FORM

PROJECT:

MA2015005 Glades Bat Survey


SITE: B4

INVESTIGATORS:

Craig Bland Matthew Baggott

DATE:

6/20/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)							
MISTNET START	2100	77.4	86.6	N	0 ① 2 3 4 5 6	① 1 2 3 4							
MISTNET END	0200	68.4	98.2	N	0 1 2 3 4 5 6	0 1 2 3 4							
LUNAR PHASE & % ILLUMINATION	New moon Waning gibbous Third quarter Waning crescent Full moon Waxing gibbous First quarter Waxing crescent					RISE (24 HR)		SET (24 HR)					
						MOON		1020		23:46			
						SUN		06:22		2050			

COMMENTS AND OTHER WILDLIFE NOTED:

No Captures

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended **Age:** A: adult; J: juvenile **Sex:** M: male; F: female

NET SITE DESCRIPTION

SITE: R5 PROJECT: MA 2015005 Glades DATES: 6/21/15

ID BY: Craig Blom, Matt Baggett QUAD: _____ COUNTY: Hall STATE: GA

Net A Width (m): 6 Height (m): 5 Lat/Long: 34.44149, -83.76448

Net B Width (m): 4 Height (m): 5 Lat/Long: 34.44127, -83.76460

Net C Width (m): 6 Height (m): 5 Lat/Long: 34.44093, -83.76476

Net D Width (m): _____ Height (m): _____ Lat/Long: _____

Anabat Lat/Long: _____

Anabat Lat/Long: _____

VEGETATION

Dominant Canopy Species:

1) Q. alba

2) B. nigra

3) L. tulipifera

Percent Canopy Closure:

Net A 10 Net C 80

Net B 70 Net D _____

Average Canopy DBH (cm):

22-26 in

Dominant Understory Species:

1) B. nigra

2) Cornus florida

3) Carpinus caroliniana

Understory Density:

Very Dense ☐

Moderate ☒

Clear ☐

Average Understory DBH (cm):

5-8 in

STREAM NAME: Flat Creek

Bank Height (m): 1.25

Channel Width (m): 7.75

Water Width (m): 6

Average Water Depth (m): .3

Dominant Substrate: sand

Turbidity (clear/cloudy): clear

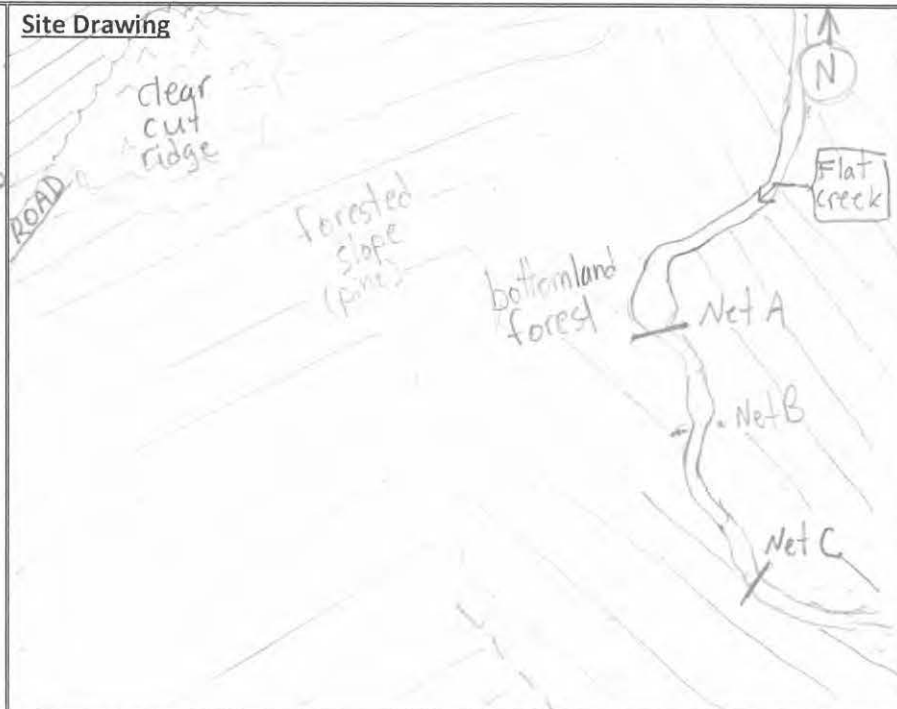
Comments/Descriptions

Bottomland forest surrounding the net site provides suitable roosting habitat for both spp.

The forested slope is steep & leads to a pine dominated community much of which has been cleared.


Mature Q. alba (Pictures) & a number of suitable snags

Site Drawing



BAT CAPTURE DATA FORM

PROJECT: Glades MA 2015005SITE: R5 INVESTIGATORS: Craig Bland, Matthew BaggottDATE: 6/21/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)											
MISTNET START	<u>2045</u>	<u>82.1</u>	<u>89</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
MISTNET END	<u>0200</u>	<u>72.6</u>	<u>98.5</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent											RISE (24 HR)		SET (24 HR)			
	27.9%											MOON		<u>11:15</u>		<u>NOSET</u>	
												SUN		<u>06:23</u>		<u>20:50</u>	

COMMENTS AND OTHER WILDLIFE NOTED:

barred owl
chuck willis widow

raccoon (procyon lotor)

bronze frog (*Lithobates clamitans*)
Coastal Plains leopard frog (*Lithobates sphenoccephalus utricularius*)
American bullfrog (*Lithobates catesbeianus*)

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. LABO	C	2045	2		E	SCAPED	From Net				
2. NYHU	A	2200	0.5	J	M	NS	9.5	32	0		
3. EPFU	A	2215	3.5	A	M	/	20.0	47	0		
4. NYHU	A	2215	1	J	M	NR	9.5	33	0		
5. EPFU	A	2215	2	A	F	P	24.0	48	0		
6. LABO	B	2315	0.25	A	M	NR	12.5	41	0		
7. EPFU	A	2315	3.5	A	F	L	20.0	49	0		
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

BAT CAPTURE DATA FORM

PROJECT: Glades MA2015005

SITE: R5 INVESTIGATORS: Craig Bland, Matthew Baggott

DATE: 6/22/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)										
MISTNET START	2045	78.2	82.4	N	0	1	2	3	4	5	6	0	1	2	3	4
MISTNET END	0200	69.7	99.5	N	0	1	2	3	4	5	6	0	1	2	3	4
LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent											RISE (24 HR)		SET (24 HR)		
		37%											MOON	12:09	00:20	
												SUN	6:23	20:50		

COMMENTS AND OTHER WILDLIFE NOTED:


Scincella lateralis
Lithobates s. verticalis
Nyla chrysocelis
Lithobates catesbeianus
Lithobates clamitans
D. coronatus

Chuck will's widow

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. EPFU	B	23:30	1.5	A	F	L	21	48	0		
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

BAT CAPTURE DATA FORM

PROJECT: Glades MA2015005SITE: R5 INVESTIGATORS: Craig Bland, Hannah GunterDATE: 6/23/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)											
						0	1	2	3	4	5	6	0	1	2	3	4
MISTNET START	<u>2050</u>	<u>80.2</u>	<u>84</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
MISTNET END	<u>0150</u>	<u>76.1</u>	<u>100</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous											RISE (24 HR)		SET (24 HR)			
	Full moon Waning gibbous Third quarter Waning crescent <u>45 %</u>											MOON		<u>1301</u>		<u>0053</u>	
												SUN		<u>0624</u>		<u>2051</u>	

COMMENTS AND OTHER WILDLIFE NOTED:

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. <u>LABJ</u>	<u>B</u>	<u>2100</u>	<u>1</u>	<u>A</u>	<u>F</u>	<u>L</u>	<u>11</u>	<u>41</u>	<u>0</u>		
2. <u>NYHU</u>	<u>C</u>	<u>21:30</u>	<u>3</u>	<u>J</u>	<u>M</u>	<u>NS</u>	<u>9</u>	<u>30</u>	<u>0</u>		
3. <u>EPFU</u>	<u>C</u>	<u>01:30</u>	<u>0.5</u>	<u>A</u>	<u>F</u>	<u>L</u>	<u>19</u>	<u>49</u>	<u>0</u>		
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

NET SITE DESCRIPTION

SITE: BC PROJECT: Glades Reservoir DATES: 6/19-6/21

ID BY: Zach Couch QUAD: _____ COUNTY: Hall STATE: GA

Net A	Width (m): <u>6</u>	Height (m): <u>5.2</u>	Lat/Long: <u>34.43372, -83.74818</u>
Net B	Width (m): <u>6</u>	Height (m): <u>5.2</u>	Lat/Long: <u>34.43393, -83.74835</u>
Net C	Width (m): <u>4</u>	Height (m): <u>5.2</u>	Lat/Long: <u>34.43449, -83.74902</u>
Net D	Width (m): _____	Height (m): _____	Lat/Long: _____
Anabat	Lat/Long: _____		
Anabat	Lat/Long: _____		

VEGETATION

Dominant Canopy Species:		Percent Canopy Closure:	Average Canopy DBH (cm): ⁱⁿ
1) <u>Liriodendron tulipifera</u>	Net A <u>50</u>	Net C <u>60</u>	<u>12</u>
2) <u>Carpinus caroliniana</u>	Net B <u>60</u>	Net D _____	
3) <u>Quercus alba</u>			
Dominant Understory Species:		Understory Density:	Average Understory DBH (cm): ⁱⁿ
1) <u>Acer saccharinum</u>	Very Dense	<input checked="" type="checkbox"/>	<u>4</u>
2) <u>Halesia tetraptera</u>	Moderate	<input type="checkbox"/>	
3) <u>Carpinus caroliniana</u>	Clear	<input type="checkbox"/>	

STREAM NAME: Flat Creek

Bank Height (m): <u>1.5</u>	Average Water Depth (m): <u>.5</u>
Channel Width (m): <u>8</u>	Dominant Substrate: <u>sand</u>
Water Width (m): <u>8</u>	Turbidity (clear/cloudy): <u>clear</u>

Comments/Descriptions


Ridge top dominated by pine/
Clear cut. The forested
slope leading to the creek
is suitable roosting habitat for
Both sp. Mature Q. alba w/
exfoliating bark + standing
snags w/ sloughing bark.

This is a narrow valley around
Creek

Site Drawing




BAT CAPTURE DATA FORM

PROJECT: Gilabes Reservoir																																																																					
SITE: H4		INVESTIGATORS: Zach Couch / Hannah Genter					DATE: 6/19/15																																																														
	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>						WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>																																																										
	MISTNET START	2100	80	70	N	0	1	2	3	4	5	6	0	1	2	3	4																																																				
	MISTNET END	02:00	68	92	N	0	1	2	3	4	5	6	0	1	2	3	4																																																				
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td rowspan="3" style="text-align: center; vertical-align: middle;">LUNAR PHASE & % ILLUMINATION</td> <td colspan="15"> New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent </td> </tr> <tr> <td colspan="15"></td> </tr> <tr> <td colspan="15"></td> </tr> </table>																LUNAR PHASE & % ILLUMINATION	New moon Waxing crescent First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent																																																			
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<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="15"></td> <td style="text-align: center;">RISE (24 HR)</td> <td style="text-align: center;">SET (24 HR)</td> </tr> <tr> <td colspan="15"></td> <td style="text-align: center;">MOON</td> <td style="text-align: center;">0924</td> <td style="text-align: center;">2309</td> </tr> <tr> <td colspan="15"></td> <td style="text-align: center;">SUN</td> <td style="text-align: center;">0622</td> <td style="text-align: center;">2049</td> </tr> </table>																																RISE (24 HR)	SET (24 HR)																MOON	0924	2309																SUN	0622	2049
															RISE (24 HR)	SET (24 HR)																																																					
															MOON	0924	2309																																																				
															SUN	0622	2049																																																				
COMMENTS AND OTHER WILDLIFE NOTED:																																																																					

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. No Captures											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

BAT CAPTURE DATA FORM

PROJECT: Glades ReservoirSITE: RL INVESTIGATORS: Zach Couch/Hannah Gunter DATE: 6/20/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)											
						0	1	2	3	4	5	6					
MISTNET START	<u>20:40</u>	<u>84</u>	<u>60</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
MISTNET END	<u>01:40</u>	<u>76</u>	<u>79</u>	<u>N</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous											RISE (24 HR)		SET (24 HR)			
	Full moon Waning gibbous Third quarter Waning crescent <u>19.4%</u>											MOON		<u>10:20</u>		<u>23:46</u>	
												SUN		<u>06:22</u>		<u>20:50</u>	

COMMENTS AND OTHER WILDLIFE NOTED:

No bat captures

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

BAT CAPTURE DATA FORM

PROJECT: Glades ReservoirSITE: RGINVESTIGATORS: Zach Couch/Hannah GunterDATE: 6/21/2015TIME
(24 HR)AIR
TEMP
(F)RH
(%)Fog
(Y/N)

SKY CONDITIONS

0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy
or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6
= thunderstorm

WIND

Beaufort Scale

0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 =
lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 =
moderate breeze (13-18 mph)

MISTNET START

20:409048N012345601234

MISTNET END

01:407579N012345601234LUNAR PHASE &
% ILLUMINATIONNew moon | Waxing crescent | First quarter | Waxing gibbous
Full moon | Waning gibbous | Third quarter | Waning crescent27.9%

RISE (24 HR)

SET (24 HR)

MOON

11:15No set

SUN

06:2320:50

COMMENTS AND OTHER WILDLIFE NOTED:

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. <u>EPFU</u>	<u>C</u>	<u>22:12</u>	<u>2.25</u>	<u>A</u>	<u>F</u>	<u>L</u>	<u>18</u>	<u>48</u>	<u>0</u>		
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

NET SITE DESCRIPTION

SITE: P1 PROJECT: Glades Reservoir MA2015005 DATES: 6/17/15/-6/18/15

ID BY: Nikki Castleberry QUAD: _____ COUNTY: Hall STATE: GA

Net A Width (m): 9 Height (m): 5.2 Lat/Long: 34.44133, -83.73560

Net B Width (m): 6 Height (m): 5.2 Lat/Long: 34.44281, -83.73216

Net C Width (m): _____ Height (m): _____ Lat/Long: _____

Net D Width (m): _____ Height (m): _____ Lat/Long: _____

Anabat Lat/Long: _____

Anabat Lat/Long: _____

VEGETATION

Dominant Canopy Species: Percent Canopy Closure: Average Canopy DBH (cm):

1) Pinus taeda Net A 80% Net C _____

2) Liriodendron tulipifera Net B 70% Net D _____

3) Quercus alba _____

Average Canopy DBH (cm): 30

Dominant Understory Species: Understory Density: Average Understory DBH (cm):

1) Aralia spinosa Very Dense ☒

2) Liquidambar styraciflua Moderate _____

3) Quercus rubra Clear _____

Average Understory DBH (cm): 10

STREAM NAME:

Bank Height (m): _____ Average Water Depth (m): _____

Channel Width (m): _____ Dominant Substrate: _____

Water Width (m): _____ Turbidity (clear/cloudy): _____

Comments/Descriptions

Nets Deployed over Romney
Savage Rd (Dirt Rd) Between
Powerline ROW + the
gate at Glade Farm Rd.

Pine/Mixed Hardwood
Community Dominated by
P. taeda. Hardwoods dispersed
throughout forest.
Lots of Sweetgum.


Site Drawing



100 Romney Savage Rd

BAT CAPTURE DATA FORM

PROJECT: GladesSITE: P1INVESTIGATORS: Nikki Castleberry/Hannah GunterDATE: 6/17/2015

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)				
MISTNET START	20:50	88°	58%	N	0 1 2 3 4 5 6	0 1 2 3 4				
MISTNET END	01:50	75°	87	N	0 1 2 3 4 5 6	0 1 2 3 4				
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>2.45</u> %					RISE (24 HR)		SET (24 HR)		
						MOON	07:32	21:43		
						SUN	06:22	20:49		

COMMENTS AND OTHER WILDLIFE NOTED:


Chuck's will widows, whp-par-will
 Bat bug collected off #11.
 Coyotes

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. EPFU	A	22:00	2	A	M	NS	30-14 (16)	48	0	—	—
2. EPFU	B	22:00	2	A	F	L	32-14 (12)	50	0	—	—
3. EPFU	A	22:41	2	A	M	S	30-14 (16.5)	48	0	—	—
4. EPFU	B	22:44	2	A	F	L	34 20	48	0	—	—
5. EPFU	B	22:44	2	J	F	NR	12	43	0	—	—
6. EPFU	A	23:00	1	J	M	NR	24-10 14	45	0	—	—
7. EPFU	A	23:30	2	J	M	NR	24-12.5 11.5	44	0	—	—
8. EPFU	A	23:30	2	A	F	L	30-14.5 20	47	0	—	—
9. EPFU	A	23:30	2	J	F	NR	28-14 14	46	0	—	—
10. EPFU	A	23:30	2	A	F	L	32-14 18	47	0	—	—
11. EPFU	A	00:46	3	A	F	P	22	47	0	—	—
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female

BAT CAPTURE DATA FORM

PROJECT: Glades Reservoir
MA2015005SITE: P1INVESTIGATORS: Nikki Castleberry/Hannah GunterDATE: 6/18/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = light breeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)											
MISTNET START	<u>20:50</u>	<u>77</u>	<u>78</u>	<u>N</u>		0	1	2	<u>(3)</u>	4	5	6	0	<u>(1)</u>	2	3	4
MISTNET END	<u>01:50</u>					0	1	2	3	4	5	6	0	1	2	3	4
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>6.25%</u>												RISE (24 HR)		SET (24 HR)		
													MOON		<u>08:29</u>	<u>22:29</u>	
	SUN		<u>06:22</u>	<u>20:49</u>													

COMMENTS AND OTHER WILDLIFE NOTED:

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1. <u>EPFU</u>	<u>A</u>	<u>22:00</u>	<u>2</u>	<u>A</u>	<u>F</u>	<u>L</u>	<u>33.5-14</u> <u>19.5</u>	<u>49</u>	<u>0</u>		
2. <u>EPFU</u>	<u>B</u>	<u>22:05</u>	<u>3</u>	<u>A</u>	<u>F</u>	<u>P</u>	<u>—</u>	<u>46</u>	<u>0</u>		
3. <u>EPFU</u>	<u>A</u>	<u>22:30</u>	<u>3</u>	<u>A</u>	<u>F</u>	<u>P</u>	<u>32-14</u>	<u>51</u>	<u>0</u>		
4. <u>EPFU</u>	<u>B</u>	<u>22:30</u>	<u>4.5</u>	<u>A</u>	<u>F</u>	<u>P</u>	<u>32-14</u>	<u>45</u>	<u>0</u>		
5. <u>EPFU</u>	<u>A</u>	<u>22:50</u>	<u>3</u>	<u>A</u>	<u>F</u>	<u>L</u>	<u>31-14</u>	<u>47</u>	<u>0</u>		
6. <u>EPFU</u>	<u>B</u>	<u>23:01</u>	<u>2</u>	<u>A</u>	<u>F</u>	<u>P</u>	<u>34</u> <u>20</u>	<u>48</u>	<u>0</u>		
7. <u>EPFU</u>	<u>B</u>	<u>23:01</u>	<u>2</u>	<u>A</u>	<u>F</u>	<u>P</u>	<u>35</u> <u>21</u>	<u>48</u>	<u>0</u>		
8. <u>EPFU</u>	<u>B</u>	<u>23:30</u>	<u>3</u>	<u>A</u>	<u>F</u>	<u>P</u>	<u>rescaped</u>				
9. <u>EPFU</u>	<u>A</u>	<u>23:35</u>	<u>1</u>	<u>A</u>	<u>F</u>	<u>P</u>	<u>20</u>	<u>47</u>	<u>0</u>		
10. <u>EPFU</u>	<u>B</u>	<u>00:20</u>	<u>3</u>	<u>A</u>	<u>M</u>	<u>S</u>	<u>16</u>	<u>47</u>	<u>0</u>		
11. <u>LABO</u>	<u>B</u>	<u>01:20</u>	<u>4</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>		
12.											
13.											
14.											
15.											

Reproductive Condition: N: non-reproductive; L: lactating; P: pregnant; PL: post-lactating; TD: testes descended Age: A: adult; J: juvenile Sex: M: male; F: female



NET SITE DESCRIPTION

SITE: P2 PROJECT: Glades Reservoir MA L01505 DATES: 6/19/15

ID BY: N. K. Castberry QUAD: _____ COUNTY: Hall STATE: GA

Net A Width (m): 6 Height (m): 5.2 Lat/Long: _____

Net B Width (m): 6 Height (m): 5.2 Lat/Long: _____

Net C Width (m): _____ Height (m): _____ Lat/Long: _____

Net D Width (m): _____ Height (m): _____ Lat/Long: _____

Anabat Lat/Long: 34.46393 / -83.68781

Anabat Lat/Long: 34.46336 / -83.69089

VEGETATION

Dominant Canopy Species: Percent Canopy Closure: Average Canopy DBH (cm):

1) Pinus taeda Net A 70% Net C _____

2) Liriodendron tulipifera Net B 80% Net D _____ 30

3) Prunus serotina

Dominant Understory Species: Understory Density: Average Understory DBH (cm):

1) Juniperus virginiana Very Dense ☒

2) Acer rubrum Moderate ☐ 10

3) _____ Clear ☐

STREAM NAME:

Bank Height (m): _____ Average Water Depth (m): _____

Channel Width (m): _____ Dominant Substrate: _____

Water Width (m): _____ Turbidity (clear/cloudy): _____

Comments/Descriptions

Site Drawing




BAT CAPTURE DATA FORM

PROJECT: Glades Reservoir
MA 2015005

SITE: P2 INVESTIGATORS: Nikki

DATE: 6/19/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS 0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm	WIND Beaufort Scale 0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)							
MISTNET START	<u>21:00</u>	<u>84</u>	<u>70%</u>	<u>N</u>	<u>0</u> <u>1</u> 2 3 4 5 6	<u>0</u> 1 2 3 4							
MISTNET END	<u>0200</u>	<u>68</u>	<u>92%</u>	<u>N</u>	<u>0</u> 1 2 3 4 5 6	0 <u>1</u> 2 3 4							
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>12.7%</u>					RISE (24 HR)		SET (24 HR)					
						MOON		23:09					
	SUN		20:49										


COMMENTS AND OTHER WILDLIFE NOTED:

Slimy Salamander
White-tailed Deer
Virginia Opossum
Screech Owl

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

BAT CAPTURE DATA FORM

PROJECT: Glades ReservoirSITE: p2 INVESTIGATORS: Zach Couch/Hannah Gunter DATE: 6/22/15

	TIME (24 HR)	AIR TEMP (F)	RH (%)	Fog (Y/N)	SKY CONDITIONS <small>0 = clear, 1 = few clouds, 2 = partly cloudy, 3 = cloudy or overcast, 4 = smoke or fog, 5 = drizzle or light rain, 6 = thunderstorm</small>	WIND Beaufort Scale <small>0 = calm (0 mph), 1 = lightwind (1-3 mph), 2 = lightbreeze (4-7 mph), 3 = gentle breeze (8-12 mph), 4 = moderate breeze (13-18 mph)</small>											
						0	1	2	3	4	5	6					
MISTNET START	<u>20:40</u>	<u>84</u>	<u>60</u>	<u>N</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
MISTNET END	<u>01:40</u>	<u>75</u>	<u>80</u>	<u>N</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
LUNAR PHASE & % ILLUMINATION	New moon <u>Waxing crescent</u> First quarter Waxing gibbous Full moon Waning gibbous Third quarter Waning crescent <u>36.8%</u>																
	RISE (24 HR) SET (24 HR)																
	MOON	<u>12:09</u> <u>00:20</u>															
SUN <u>06:23</u> <u>20:50</u>																	

COMMENTS AND OTHER WILDLIFE NOTED:

Whip-poor-will callsNo bat captures

Species	Net	Time	Height in net (m)	Age	Sex	Reprod. Cond.	Weight (g)	RFA (mm)	Wing Scar Score	Frequency	Band #
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											
11.											
12.											
13.											
14.											
15.											

Appendix D: Comprehensive Bat Capture Table

Bat capture data by site for the proposed Glades Reservoir project located in Hall, County, Georgia, June 13-June 23, 2015.

Site	Date	Species	Net	Time	Height in Net (m)	Age	Sex	Repro Condition	Weight (g)	Forearm Length (mm)	Wing Score
R1	6/16/2015	LABO	B	21:10	0.5	A	F	L	14.5	42	0
		LABO	B	21:35	1.0	A	M	N	13.5	44	0
		EPFU	C	21:40	2.0	A	F	L	22.25	49	0
		NYHU	C	22:00	3.5	A	M	N	10.0	33	0
		EPFU	B	22:40	4.5	A	F	P	22.5	50	0
		LABO	B	23:53	1.0	A	F	L	16.5	46	0
		EPFU*	C	23:54	4.5	A	F	--	--	--	--
		EPFU	B	00:32	3.5	A	F	L	20.5	46	0
	6/17/2015	EPFU	C	21:55	2.5	A	F	L	19.5	47	0
		EPFU	A	21:59	0.5	A	F	L	19.0	45	1(P)
		EPFU	B	22:12	1.5	A	F	L	21.75	47	0
		LABO	B	23:14	0.5	A	F	L	16.5	39	0
		LABO	B	23:31	0.5	A	M	TD	15.5	39	0
		EPFU	C	00:00	3.0	A	F	L	19.5	47	0
	6/18/2015	LABO	C	21:40	1.5	A	F	L	14.75	41	0
		EPFU	C	22:55	2.5	A	F	L	24.5	46	0
R2	6/15/2015	LABO	A	20:45	0.1	A	F	L	12.0	44	0
		LABO*	A	21:30	3.0	--	--	--	--	--	--
		LABO	B	21:30	0.5	A	M	N	12.5	43	0
		EPFU	A	21:45	2.5	A	F	L	18.0	46	0
		LABO	A	22:15	0.5	A	M	N	12.0	42	0
		EPFU	A	22:30	1.5	A	F	P	20.5	47	0
		EPFU	A	22:45	3.5	A	F	P	20.0	47	0
		EPFU	A	23:15	5	A	F	P	21.5	49	0 (P)
		EPFU	A	23:15	1	A	F	P	19.5	49	0
		EPFU*	A	23:50	4.5	A	F	P	--	--	--
		EPFU	A	01:00	0.25	A	F	P	22.0	48	0

Site	Date	Species	Net	Time	Height in Net (m)	Age	Sex	Repro Condition	Weight (g)	Forearm Length (mm)	Wing Score
R2	6/16/2015	LABO	A	20:45	0.25	A	F	L	--	42	0
		EPFU	A	21:45	1	A	F	P	18.0	46	0
		EPFU	A	01:45	0.25	A	F	P	22.0	47	0
	6/17/2015	LABO	A	20:50	1	A	F	L	13.0	43	0 (P)
		LABO	A	20:50	1	A	F	L	--	--	--
		LABO	B	21:30	1	A	M	N	12.0	37	0
R3	6/13/2015	EPFU	B	22:35	1.5	A	F	P	24.25	49	0
		EPFU	B	01:45	2	A	F	P	23.0	47	0
	6/14/2015	EPFU	B	22:45	1.5	A	F	L	23.5	46	0
		EPFU	A	23:39	4	A	F	L	21.0	46	0
R4	6/18/2015	LABO	C	01:00	2	A	F	L	14.0	41	0
R5	6/21/2015	LABO*	C	20:45	2	--	--	--	--	--	--
		NYHU	A	22:00	0.5	J	M	N	9.5	32	0
		EPFU	A	22:15	3.5	A	M	--	20.0	47	0
		NYHU	A	22:15	1	J	M	N	9.5	33	0
		EPFU	A	22:15	2	A	F	P	24.0	48	0
		LABO	B	23:15	0.25	A	M	N	12.5	41	0
		EPFU	A	23:15	3.5	A	F	L	20.0	49	0
	6/22/2015	EPFU	B	23:30	1.5	A	F	L	21.0	48	0
	6/23/2015	LABO	B	21:00	1	A	F	L	11.0	41	0
		NYHU	C	21:30	3	J	M	N	9.0	30	0
		EPFU	C	01:30	0.5	A	F	L	19.0	49	0
R6	6/21/2015	EPFU	C	22:12	2.5	A	F	L	18	48	0
P1	6/17/2015	EPFU	A	22:00	2	A	M	N	16	48	0
		EPFU	B	22:00	2	A	F	L	18	50	0
		EPFU	A	22:44	2	A	M	TD	16.5	48	0
		EPFU	B	22:44	2	A	F	L	20	48	0
		EPFU	B	22:44	2	J	F	N	12	43	0

Site	Date	Species	Net	Time	Height in Net (m)	Age	Sex	Repro Condition	Weight (g)	Forearm Length (mm)	Wing Score
P1	6/17/2015	EPFU	A	23:00	1	J	M	N	14	45	0
		EPFU	A	23:30	2	J	M	N	11.5	44	0
		EPFU	A	23:30	2	A	F	L	20	47	0
		EPFU	A	23:30	2	J	F	N	14	46	0
		EPFU	A	23:30	2	A	F	L	18	47	0
		EPFU	A	00:46	3	A	F	P	22	47	0
	6/18/2015	EPFU	A	22:00	2	A	F	L	19.5	49	0
		EPFU	B	22:05	3	A	F	P	--	46	0
		EPFU	A	22:30	3	A	F	P	18	51	0
		EPFU	B	22:30	4.5	A	F	P	18	45	0
		EPFU	A	22:50	3	A	F	L	17	47	0
		EPFU	B	23:00	2	A	F	P	20	48	0
		EPFU	B	23:00	2	A	F	P	21	48	0
		EPFU	B	23:30	3	A	F	P	--	--	--
		EPFU	A	23:35	1	A	F	P	20	47	0
		EPFU	B	00:20	3	A	M	TD	16	47	0
		LABO*	B	01:20	4	--	--	--	--	--	--

Age: A=adult, J=juvenile;

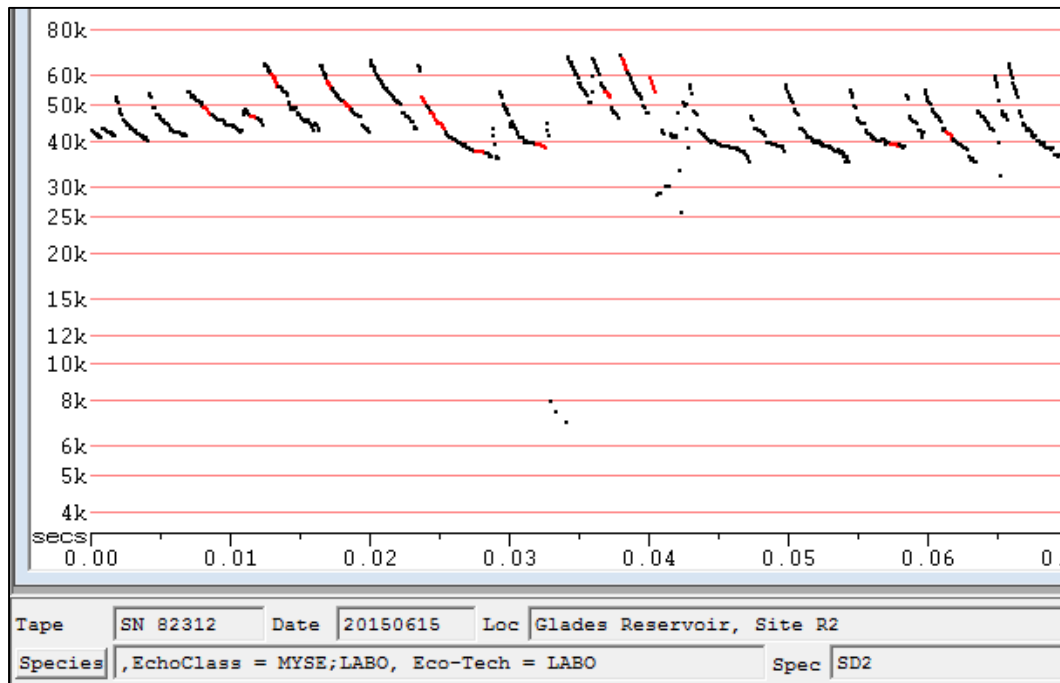
Sex: F=female, M=male;

Reproductive Condition: L=lactating, N=non-reproductive, P=pregnant, PL= post-lactating, TD=Test descended;

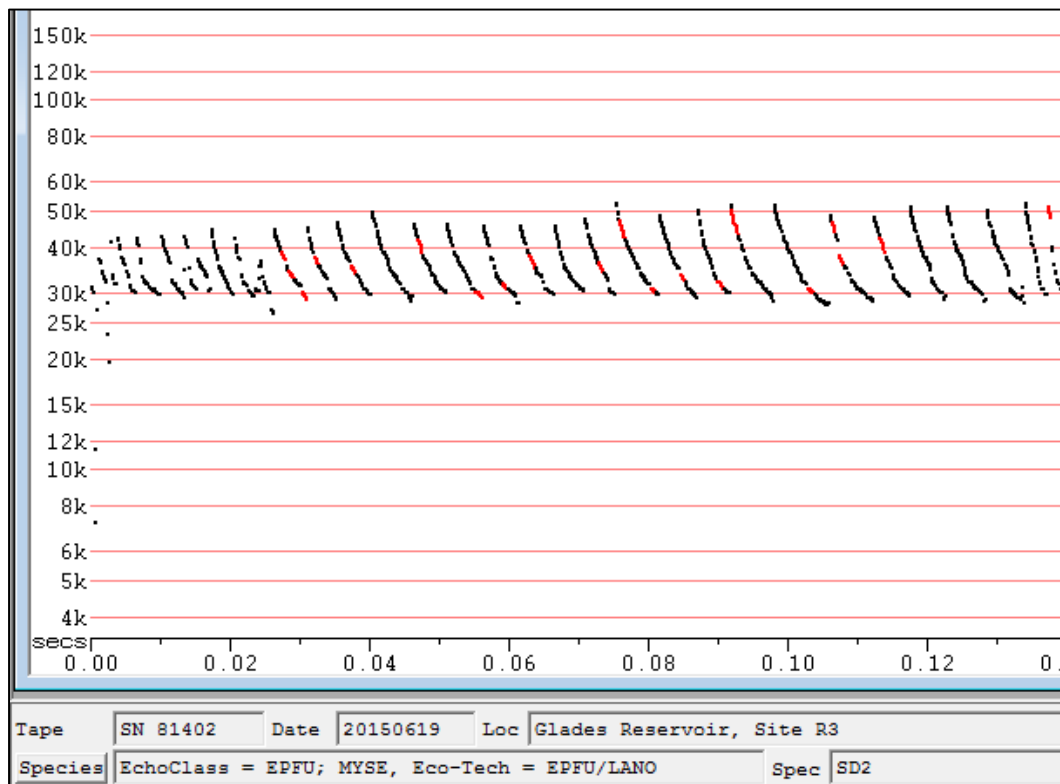
Species: LABO = *Lasiurus borealis*

*Escaped

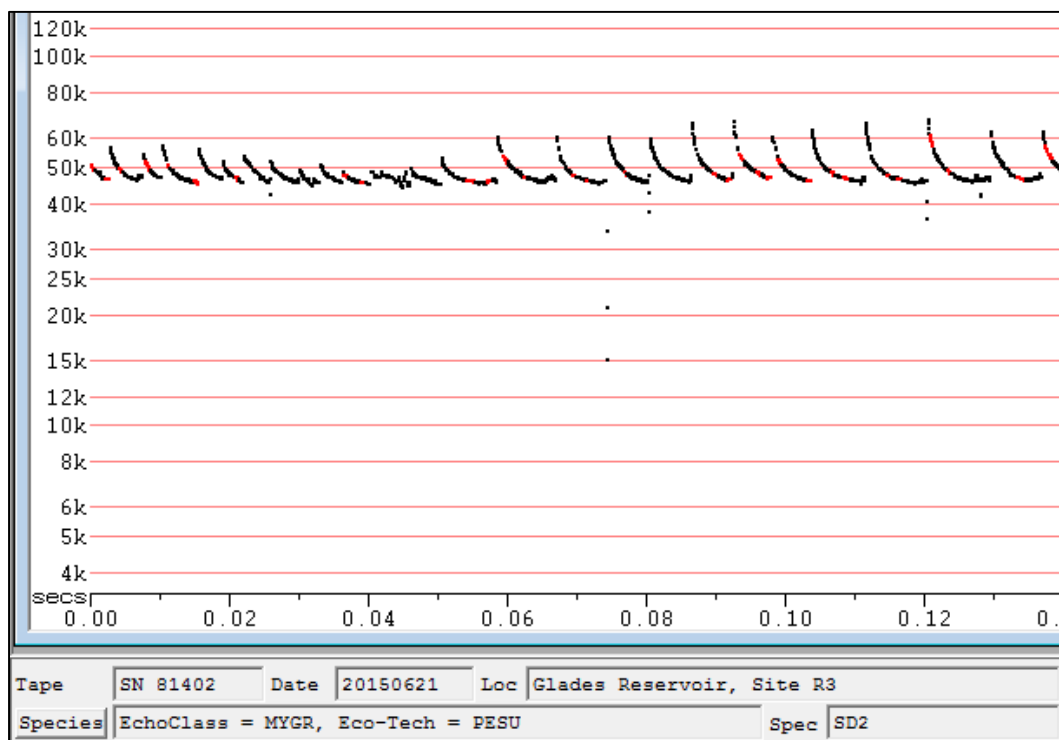
Appendix E: Representative Acoustic Sonograms



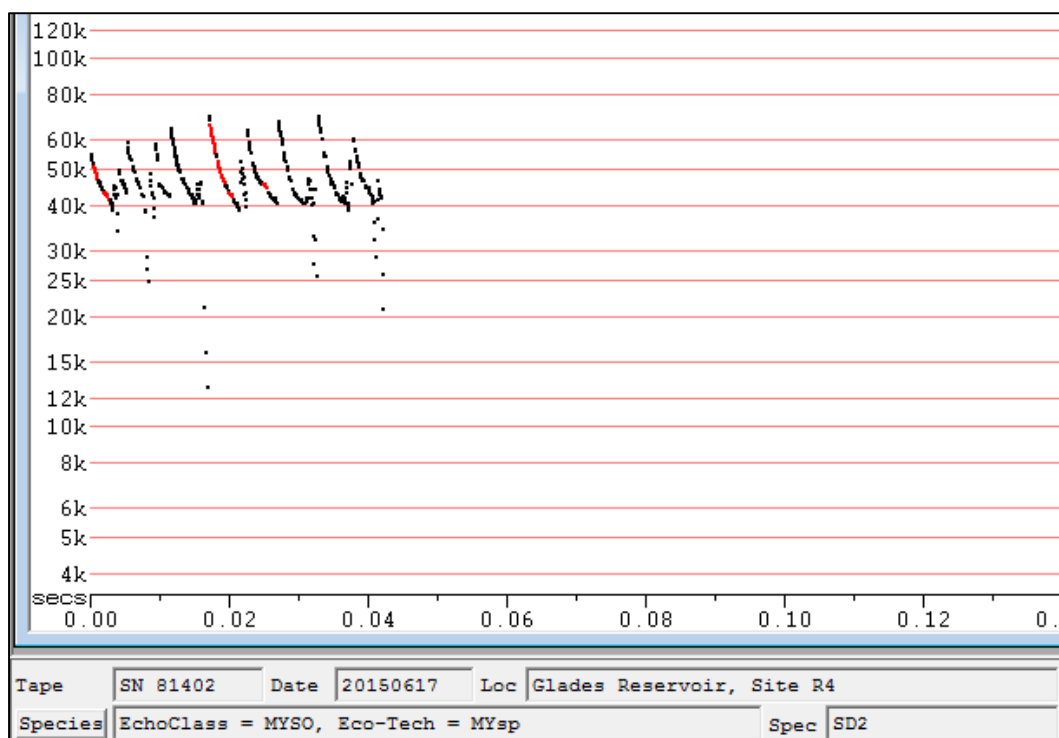
EchoClass = *Myotis septentrionalis*; *Lasiurus borealis* ; Eco-Tech = *Lasiurus borealis*



EchoClass = *Eptesicus fuscus*; *Myotis septentrionalis* ; Eco-Tech = *Eptesicus fuscus*; *Lasionycteris noctivagans*



EchoClass = *Myotis grisescens*, Eco-Tech = *Perimyotis subflavus*



EchoClass = *Myotis sodalis*, Eco-Tech = indistinguishable *Myotis* spp.

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Glades Reservoir DEIS



APPENDIX T

SHPO COORDINATION – CULTURAL RESOURCES



DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
100 W. OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401-3640

REPLY TO

ATTENTION OF:

Regulatory Division
SAS-2007-00388

FEBRUARY 13 2015

Dr. David Crass, Director and Deputy SHPO
Historic Preservation Division
Georgia Department of Natural Resources
Mary Gregory Jewett Center for Historic Preservation and Archaeology
2610 GA Hwy 155, SW
Stockbridge, GA 30281

Dear Dr. Crass:

I refer to Department of the Army application SAS-2007-00388, submitted by the Hall County Board of Commissioners in 2011, for a permit to construct the Glades Reservoir water supply project, in Hall County, Georgia. I also refer to your letters dated August 26, 2009, and April 29, 2014, concerning the proposed undertaking's potential effects to historic properties.

In your letter of August 26, 2009, responding to our request for your comments on the cultural resources survey for the proposed reservoir, your office commented that the Glade Farm, *per se*, might qualify as a National Register eligible historic landscape; we had agreed by consensus that the Glade Farmhouse was National Register eligible, under Criteria a and c, and possibly b. However, you indicated the report lacked a rural historic landscape assessment of the Glade Farm property and, therefore, it was difficult to define its boundaries or make any comments regarding the proposed reservoir's effects to the Glade Farm historic property (district).

By letter dated March 31, 2014, we provided additional information concerning the Glade Farm Historic District/rural landscape district; including a series of ground-level panoramic views along various site lines, and an aerial photograph of the farm and its surrounding environment, which indicated the estimated boundaries of the proposed impoundment. Your response dated April 29, 2014, stated that the information provided to date was still insufficient to define the boundaries of the Glades Farm Historic property (district). Specifically, you requested research concerning the present day and historical boundaries of Glades Farm. You also recommended updating the cultural resources survey (i.e., conducting a supplementary re-survey) to identify properties that might now need to be evaluated as historic properties, as the original survey was over a decade old.

The following enclosures are provided in response to your comments and request for additional information:

a. An aerial photograph-based figure/map (Figure 1), prepared by AECOM, showing the location of the Glade Farm main residence and associated outbuildings (historic and non-historic), with the outline of the proposed reservoir superimposed; with the estimated boundaries of the 1820 Land Lottery Lot 100 superimposed on both. This figure also shows woodlands, pasture and cropland within and surrounding the project area, and Flat Creek and other drainages.

b. A memorandum providing the justification for the Glades Farm National Register-eligible Historic District (Rural Landscape) boundaries, based on the qualifying criteria of eligibility (Criteria a, b, and c), revised from a document provided by AECOM, dated January 30, 2015.

c. The results of a field reconnaissance survey to update the original cultural resources survey, with additional information concerning the property identified in the original survey report as "Historic Resource E," and the structure identified as the Mose Gordon Lumber Company Mess Hall.

Since the time of the original survey, at which time Resource E had evidently been abandoned for some period of time, it has fallen completely into ruins. As a result, your staff recommended that the property be re-evaluated as an archaeological site, and that a site form be completed for it. This has been done, and AECOM recommends the property should be considered ineligible for inclusion in the NRHP (documentation enclosed).

The structure identified as the Mose Gordon Lumber Company Camp mess hall was determined to be within the proposed undertaking's area of potential effect. After reviewing the structure and its history, AECOM has recommended the structure as eligible for the NHRP under Criterion a. We concur in that recommendation on the basis of the information and reasoning presented (documentation enclosed).

After reviewing all available information concerning the Glades Farm property and its history, and in consideration of its qualifications for inclusion in the NRHP under Criteria a, b, and c, we feel that the property's era of historical significance is from 1820 until roughly the end of the Civil War, for its association with the original 1820 land lottery following the Cherokee land cessions, its association with the Floyd, Banks, and Major John Bell families, and their association with the gold mining era in north Georgia and 19th century agricultural trends in the region. Therefore, and following guidance regarding the definition of historic districts and rural landscape districts, we also recommend that the Historic Glades Farm property boundaries be set as those of the original 1820 Land Lot 100, awarded to James Floyd (see the attached memo).

If the boundary of the Glades Farm Historic District are set as the (approximated) boundaries of 1820 Land Lottery Lot 100, referring to Figure 1, it is apparent that roughly 85% of that property would be inundated by the footprint of the proposed reservoir, with only a small portion of uplands in the northeastern quadrant of that land lot, including a portion where the Glades Farm residence is located, above the flood pool. Roughly 25-30% of the area that would be inundated is currently open fields and pasture. The remainder is heavily wooded. The proposed undertaking's effects to the Glade Farm Historic District, therefore, would be adverse and would radically alter its setting, though the main farmhouse would not be physically affected.

We request your review of the enclosed information, and your comments regarding the NRHP-eligibility status of Resource E, The Gordon Lumber Company Mess Hall. We also request your comments regarding the definition of the Glades Farm Historic District, and our assessment of the proposed undertaking's effects to that historic property.

If you have any questions regarding this matter, or require any additional information, please contact me at (912) 652-5139, or Mr. Dave Crampton, Staff Archeologist and Historic Preservation Specialist at: 912-652-5840.

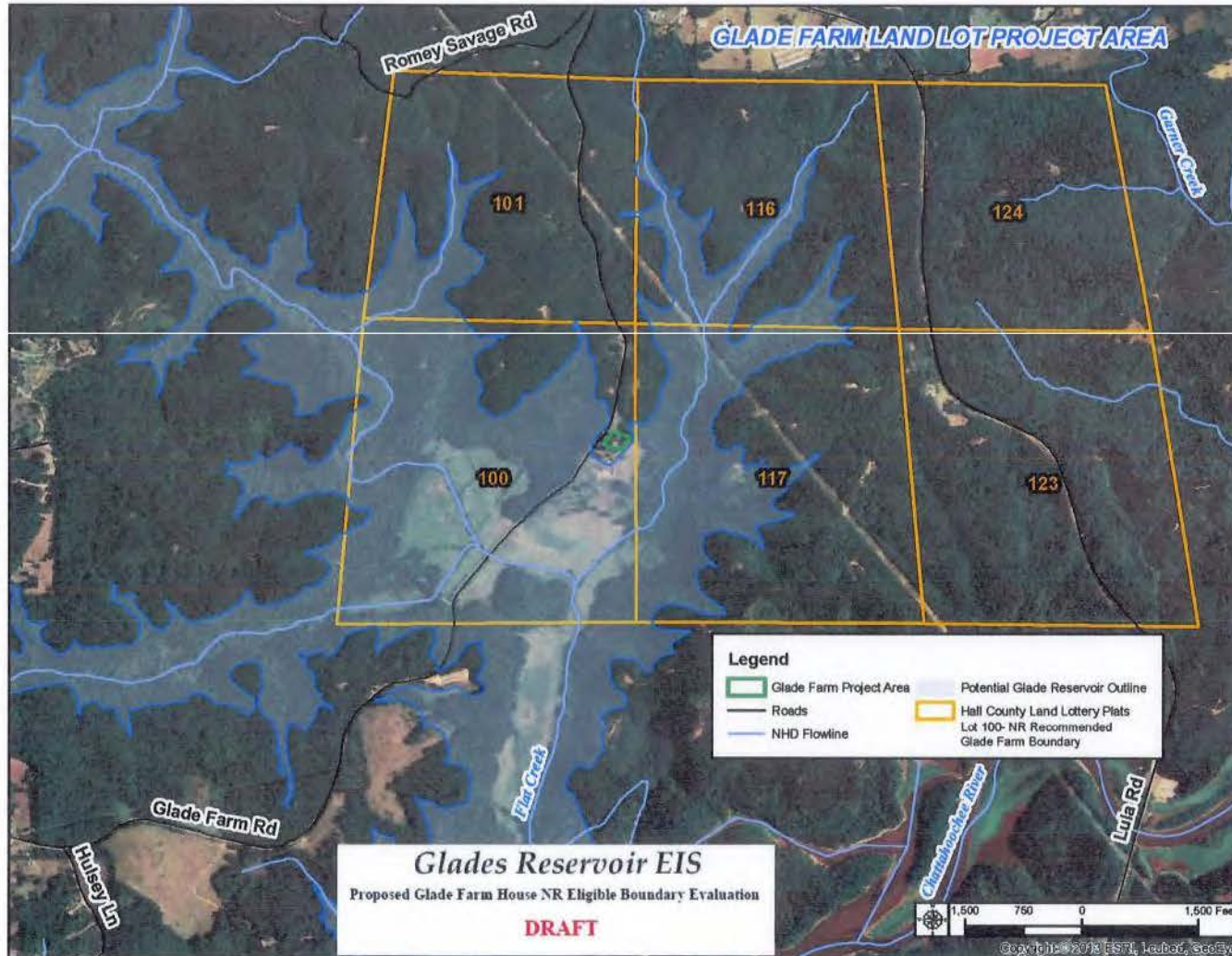
Sincerely,



Richard Morgan
Project Manager, Multi-Purpose Mgmt. Branch

Enclosures

Figure 1: National Register Recommended Glade Farm Boundary - Lot 100



GEORGIA ARCHAEOLOGICAL SITE FORM

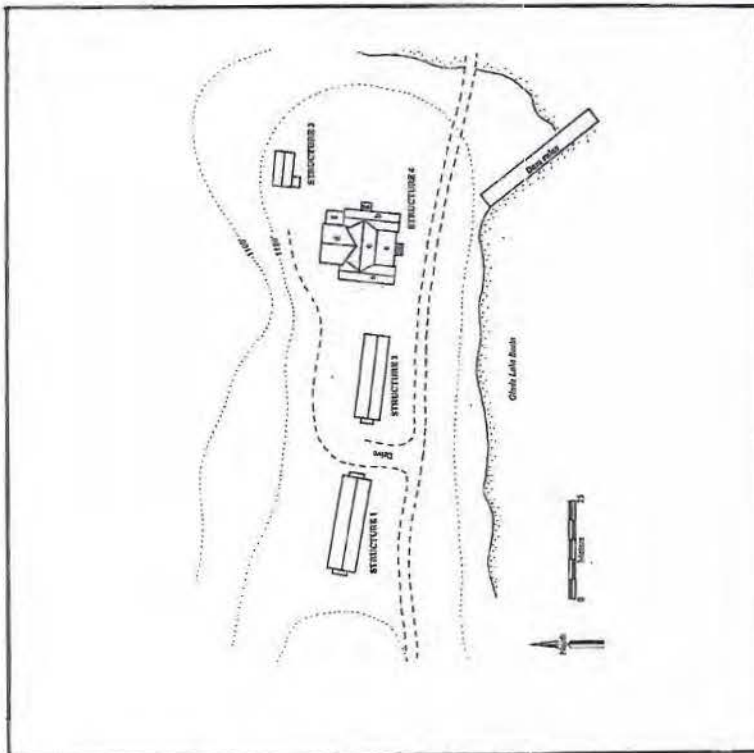
1990

Official Site Number: _____

Institutional Site Number: _____ Site Name: Property E
 County: Hall Map Name: Lula USGS or USNOAA
 UTM Zone: 17N UTM East: 248206.5 UTM North: 3812426.4
 Owner: Hall County Address: PO Drawer 1435, Gainesville, GA 30503
 Site Length: 40 meters Width: 50 meters Elevation: + - 850 meters
 Orientation: 1. N-S 2. E-W 3. NE-SW 4. NW-SE 5. Round 6. Unknown
 Kind of Investigation: 1. Survey 2. Testing 3. Excavation 4. Documentary
 5. Hearsay 6. Unknown 7. Amateur
 Standing Architecture: 1. Present 2. Absent But collapsing
 Site Nature: 1. Plowzone 2. Subsurface 3. Both 4. Only Surface Known
 5. Unknown 6. Underwater
 Midden: 1. Present 2. Absent 3. Unknown Features: 1. Present 2. Absent 3. Unknown
 Percent Disturbance: 1. None 2. Greater than 50 3. Less than 50 4. Unknown
 Type of Site (Mill, Mound, Quarry, Lithic Scatter, etc.): Historic encampment (see
continuation sheet for further details)
 Topography (Ridge, Terrace, etc.): Ridge top

Current Vegetation (Woods, Pasture, etc.): Mature woods and re-growth (see
continuation sheet for further details)

Additional Information: Four barracks-like structures in a state of collapse
are on the site, built sometime between 1937 and 1943. See continuation
sheet for more detail on the site.



SKETCH MAP
 (Include sites, roads, streams, landmarks)



OFFICIAL MAP
 (Xerox of proper map)

State Site Number: _____ Institutional Site Number: _____

Public Status: 1. National Historic Landmark 2. National Natural Landmark
3. Georgia Register 4. Georgia Historic Trust 5. HABS 6. HAER

National Register Standing: 1. Determined Eligible 2. Recommended Ineligible
3. Recommended Eligible 4. Nominated 5. Listed 6. Unknown 7. Removed

National Register Level of Significance: 1. Local 2. State 3. National

Preservation State (Select up to Two): 1. Undisturbed 2. Cultivated 3. Eroded
4. Submerged 5. Lake Flooded 6. Vandalized 7. Destroyed 8. Redeposited
9. Graded 10. Razed / Collapsed

Preservation Prospects: 1. Safe 2. Endangered by: Proposed Hall Co. reservoir
3. Unknown

RECORD OF INVESTIGATIONS

Supervisor: George Price Affiliation: TRC Date: 2002

Report Title: Cultural Resources Survey of the Proposed 850-Acre
Glades Reservoir on Flat Creek, Hall County, Georgia

(See continuation sheet for more detail.)

Other Reports: Glades Reservoir Historic Structures & Landscape Sight
Lines. AECOM/Rochester, March 2014 (see continuation for more detail)

Artifacts Collected: None

Location of Collections: N/A

Location of Field Notes: TRC

Private Collections: None documented

Name: _____ Address: _____

CULTURAL AFFINITY

Cultural Periods: Historic, mid-20th century

Phases: _____

FORM PREPARATION AND REVISION

Date	Name	Institutional Affiliation
<u>4 Sept. 2014</u>	<u>John Lawrence</u>	<u>AECOM</u>
_____	_____	_____
_____	_____	_____

Type of Site:

The site is defined by a compound of several barracks-like buildings arranged irregularly along a ridge top. The 1966 USGS topographic quadrangle indicates the presence of six structures, whereas, at the time of the 2002 survey, four were present. TRC speculated that several buildings were probably incorporated into the largest of the four structures observed in 2002 (e.g., "Structure 4" of their survey). The size, number and type of buildings suggest that the site functioned as an encampment for large groups of people to engage in common activity(ies).

Historical map research conducted by TRC in 2002 suggests that initial construction of the buildings occurred sometime between 1937 and 1943, which are dates they found consistent with the design, materials, construction methods and apparent age of the structures standing in 2002. The property on which the site is located was purchased by the Moses Gordon Lumber Company sometime prior to 1943, but according to a local oral informant, the Civilian Conservation Corps (CCC) built the camp. TRC (2002:32) noted that CCC enrollment declined in 1940 and that it was only active in the area until 1942. Independent verification of a CCC presence here has not been made and if the organization was present, its presence would appear to have been of short duration.

Historic map research also indicates that the site may have been used by the Boy Scouts of America during the 1950s (TRC 2002:35). TRC's research did not provide independent confirmation for the Boy Scouts' use of the property.

By 2002 the buildings had been abandoned for a number of years. By 2014 they were mostly or completely collapsed (see attached photographs).

Current Vegetation:

The northern, eastern and western perimeter of the site consists of mature deciduous forest. Former clearing where the site structures stood and extending to the southern limits of the site are in secondary succession regrowth. Saplings measuring 5-10 feet tall, vines, and other undergrowth predominate amongst the collapsed buildings.

Record of Investigation

TRC, Inc.

2002 *Cultural Resources Survey of the Proposed 850-Acre Glades Reservoir on Flat Creek, Hall County, Georgia*. Report on file, Georgia State Historic Preservation Office.

Summary:

The survey consisted of a historic structures survey for above-ground cultural resources and Phase I archaeological testing for below-ground cultural resources within the APE. "Property E" was treated exclusively as an above-ground resource in 2002 and recommended not eligible for listing on the National Register of Historic Places. In 2009 the GASHPO assessed the property to be potentially eligible under Criteria A and C, due to its probable association with the CCC.

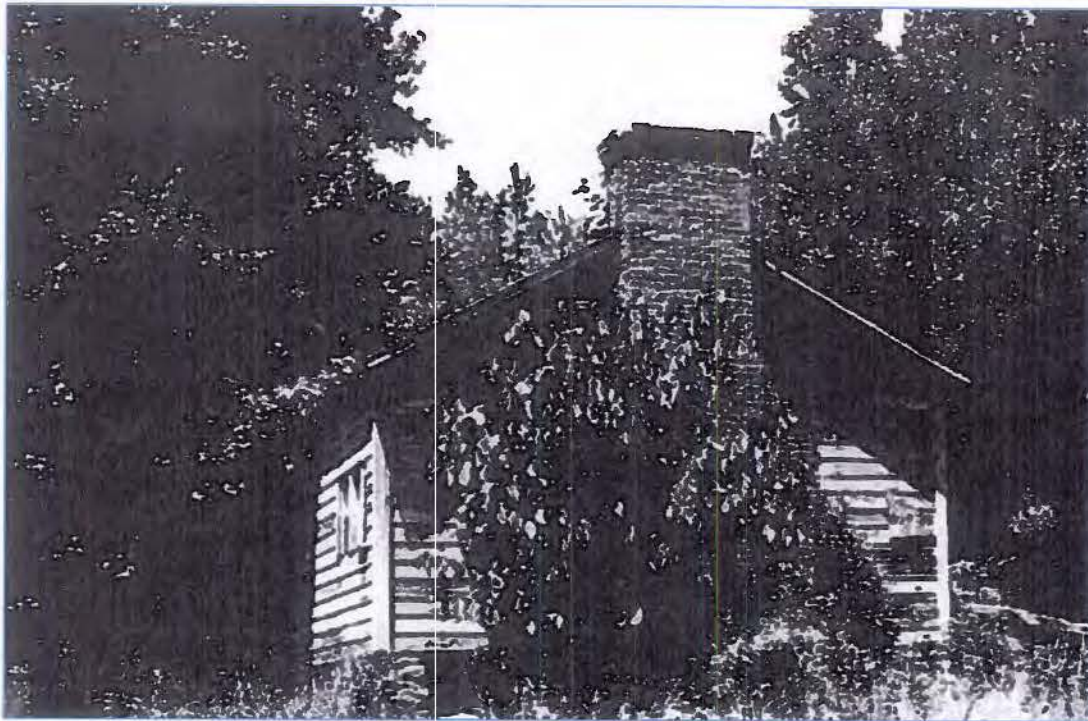
AECOM/Rochester

2014 *Historic Structures and Landscape Site Lines*. Report on file, Georgia State Historic Preservation Office.

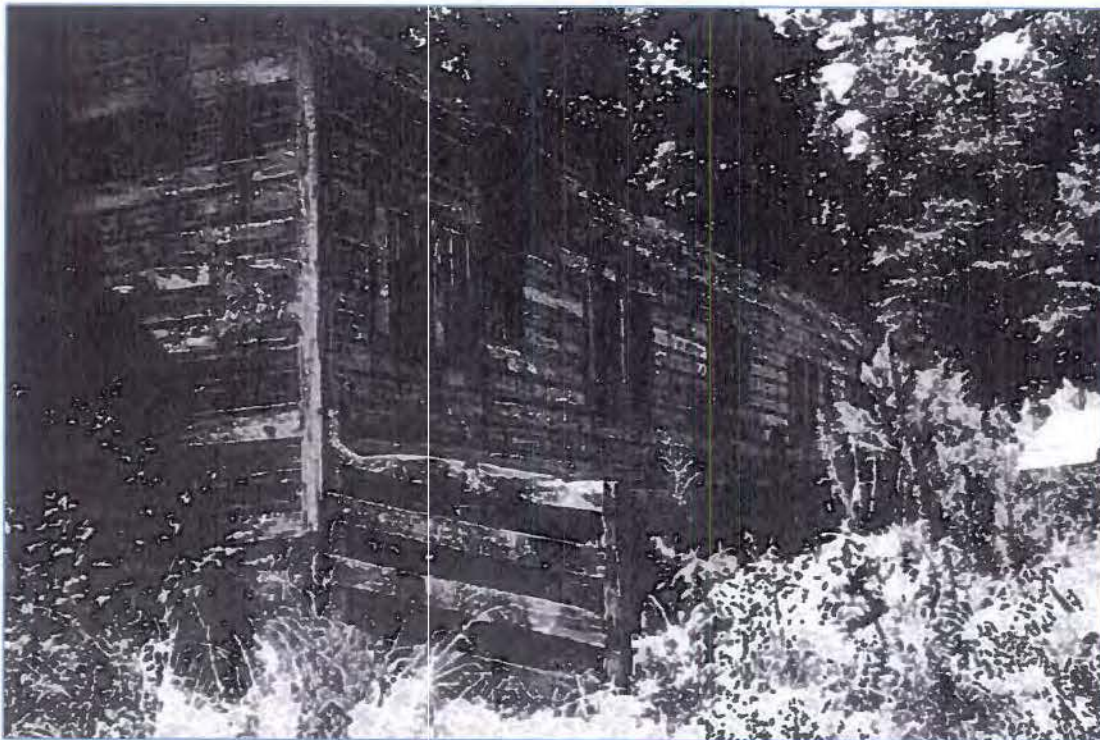
Summary:

In response to a 2009 GASHPO request for updated information on the Property E, AECOM/Rochester produced photographic documentation of existing conditions on the site in 2014. The photographic documentation illustrates the advanced deterioration of all buildings recorded on site in 2002: Structure 4 is gone with the exception of the brick chimney; Structures 1, 2 and 3 are partially if not completely collapsed (see attached photographs).

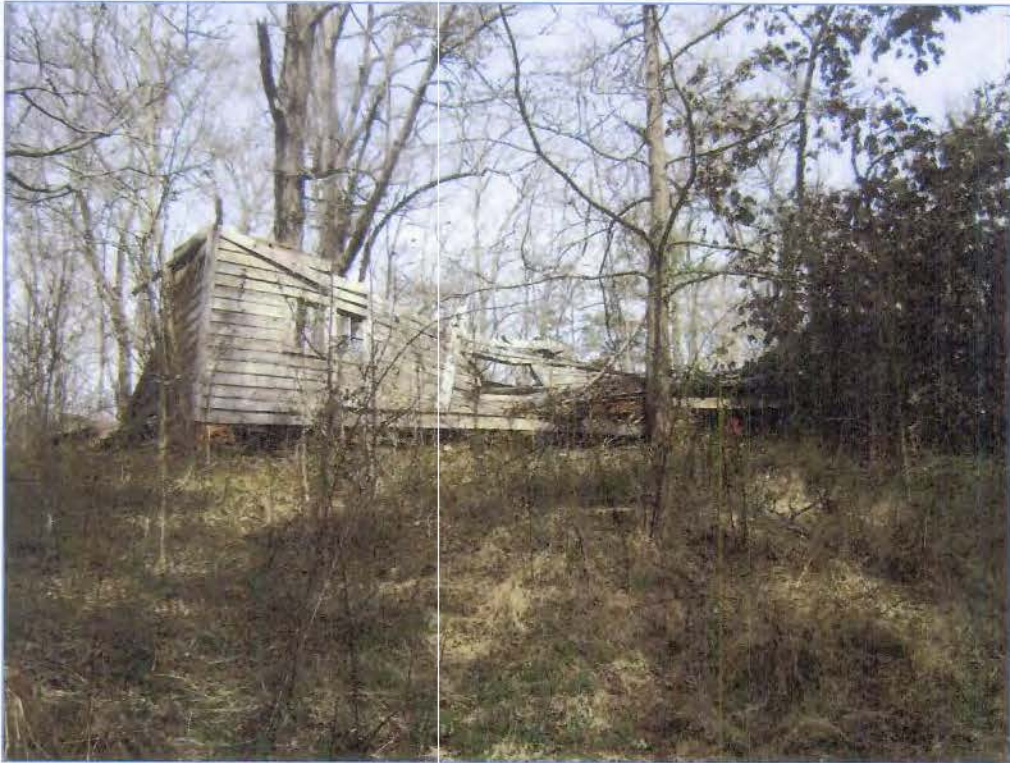
Site Photographs



Structure 1, East elevation in 2002



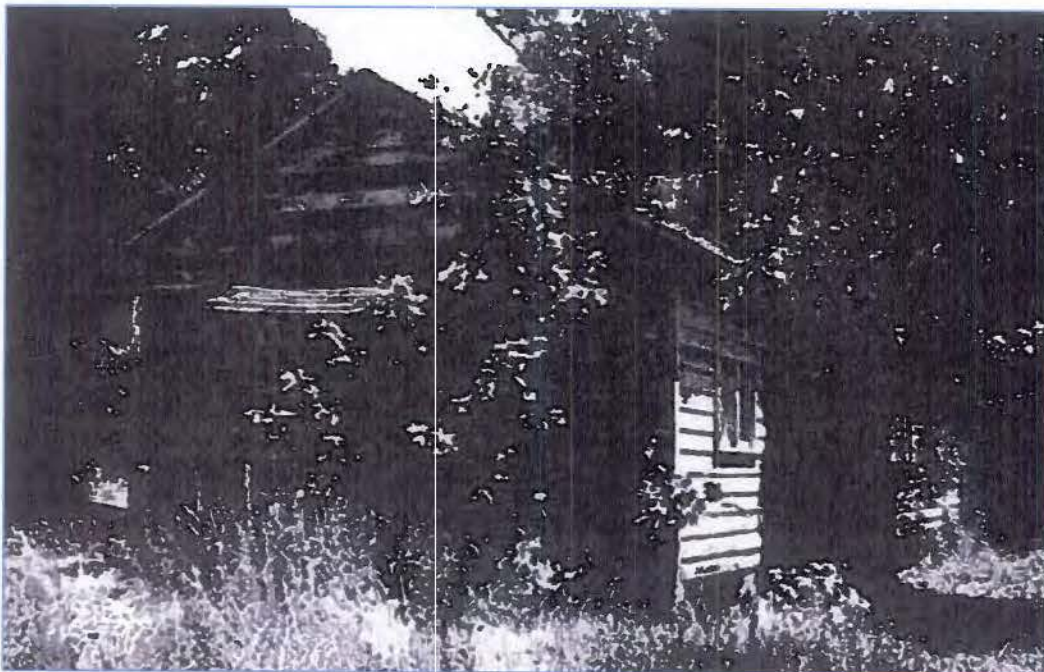
Structure 1, Northeast corner and north facade in 2002



Structure 1, facing south in 2014



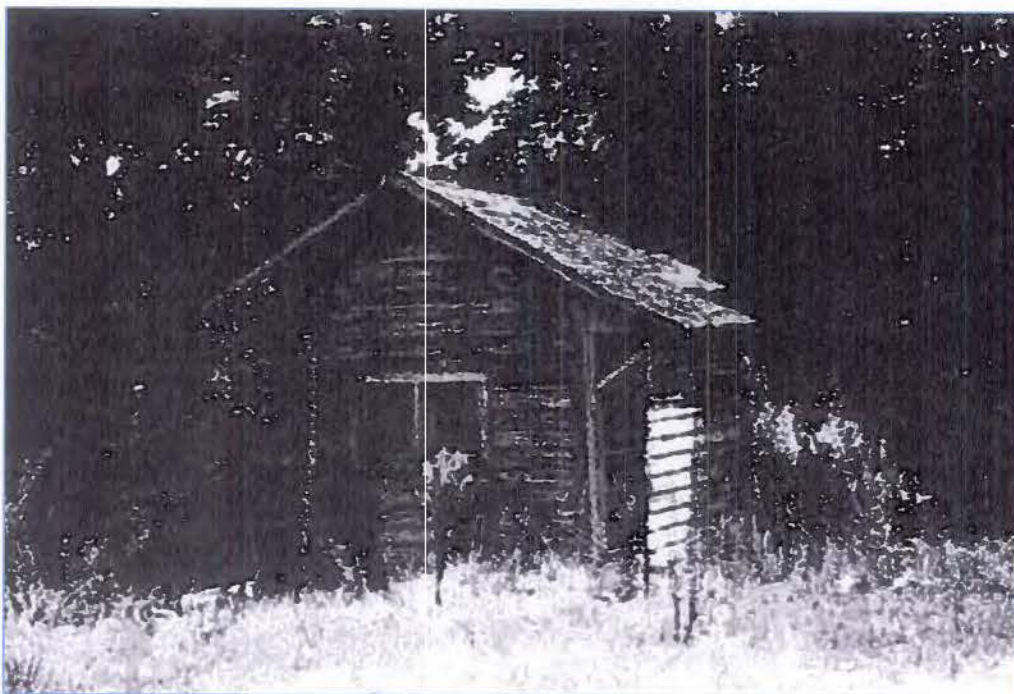
Structure 1, Southeast corner in 2014



Structure 2, West elevation in 2002



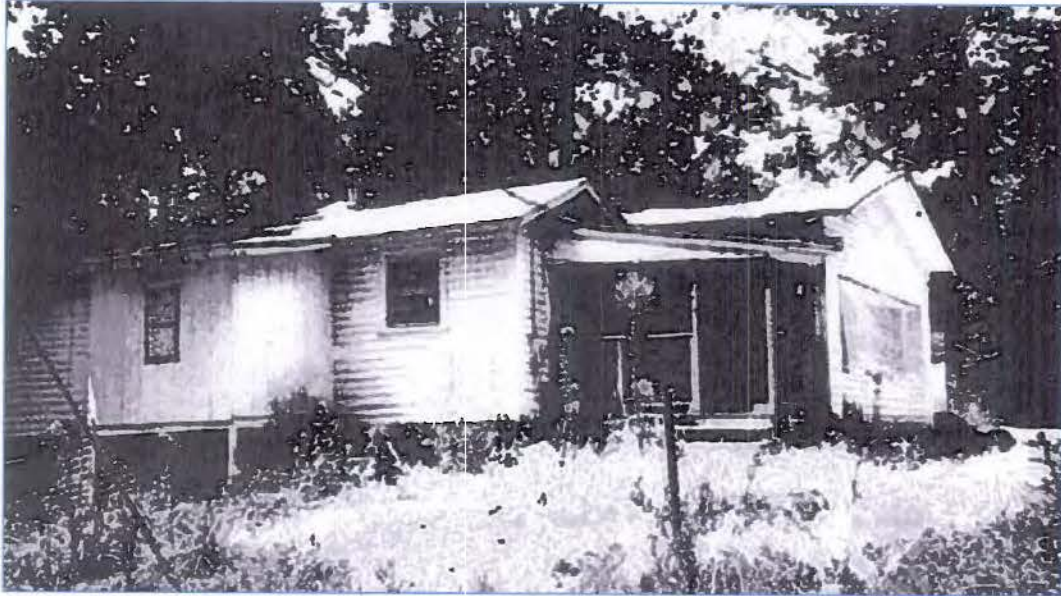
Structure 2, South facade in 2014



Structure 3, Southwest corner in 2002



Structure 3, facing South in 2014



Structure 4, Southwest corner and primary facade in 2002



Remains of Structure 4 in 2014

BOUNDARY JUSTIFICATION FOR THE GLADES FARM (RURAL LANDSCAPE) HISTORIC DISTRICT

1. Background

In 2011 Hall County, Georgia, reapplied to the Savannah District for a Section 404 Permit under the Clean Water Act, for a permit to construct a dam on Flat Creek to create a water supply reservoir. A cultural resources survey had been conducted, in 2002, of the proposed 850-acre impoundment for an earlier permit application. During that survey the Glade Farm House was identified as an historic property potentially eligible for inclusion in the National Register of Historic Places.

In 2009, in connection with a 2007 permit application for the same reservoir, Section 106 consultation between the Georgia State Historic Preservation Officer (GASHPO), and the Savannah District, U.S. Army Corps of Engineers (USACE), the Glade farm was determined eligible for inclusion in the National Register of Historic Places (NRHP), by consensus, on the basis of the information concerning it contained in the 2002 cultural resources survey report prepared by TRC, Inc. It was determined eligible under Criteria a and c, and possibly b (pending additional information), of the National Register of Historic Places.

The GASHPO's letter, dated August 26, 2009 and signed by Deputy SHPO Ray Luce, indicated, also, that additional information was needed in order to determine the proposed reservoir's potential effects to this historic property. It stated:

"The report lacks a rural historic landscape assessment of Glade Farm, which would identify extant agricultural fields, patterns of social organization, boundary demarcations, circulation networks, and small-scale elements. This assessment would facilitate the formation of a NRHP boundary for the property, which would assist with a more complete assessment of effects."

The 2007 permit application expired prior to the resolution of this issue. In March and April 2014, Section 106 consultation was resumed between the GASHPO staff at the Georgia Department of Natural Resources (GADNR), Historic Preservation Division (HPD). At that time Savannah District supplied additional information to the GASHPO concerning the Glades Farm property, via a letter dated March 31, 2014, in the form of a series of ground-level panoramic views along various site lines, and an aerial photograph of the farm and its surrounding environment, along with the estimated boundaries of the proposed impoundment. At that time we requested SHPO's comments on the boundaries of the Glades Farm (Landscape) Historic District. The GASHPO responded via letter of April 29, 2014:

SUBJECT: Boundary Justification for the Glades Farm (Rural Landscape) National Register-eligible Historic District, Glades Reservoir Water Supply Project, Hall County, DA Permit Application No. 2007-00388/HP-090713-002

"HPD is unable to evaluate the boundary of Glades Farm without additional information. HPD recommends updating the [the 2002] survey to include any additional historic resources that may have come of age since the original survey was completed over a decade ago, along with research and information regarding the historic and current boundaries of Glades farm, as previously recommended in our letter dated August 26, 2009."

In response to the GASHPO's comments, Savannah District requested the 3d party EIS consultant to provide more detailed information on the ownership and history of the farm, and its legal boundaries, both present and historical. In particular a map overlay showing the approximate footprint of the proposed reservoir, the Glade Farm main house, the Glade Farm property limits, and the historical limits of the farm during the era(s) of significance (see Figure 1). Following a number of telephone conferences with the 3d party EIS consultant discussing the history of the farm, its size over time, and the qualifying Criteria under which it is considered eligible, the consultant provided the graphic and written information that was requested. It is upon that information, contained in their Memorandum of January 30, 2015 (revised 10 February 2015), that the following Glades Farm (Rural Landscape) Historic District is based.

Qualifying Criteria

Glades Farm is considered eligible under Criterion A, as a property expressing significance possessing integrity of location, design, setting, materials, workmanship, feeling and association "associated with events that have made a significant contribution to the broad patterns of history," because of:

- 1) its association with the expansion of the western frontier of Georgia via the 1820 Georgia Land Lottery that opened up former Cherokee Territory after the land cessions;
- 2) its establishment in the second and third decades of the 19th century as a farm involved in a mixed farming economy combining animal husbandry with the raising of cereal grain crops and tobacco for local and extra-local consumption; and
- 3) its association, by virtue of the other interests of some of its early owners, with the gold-mining boom of the 1830s and 1840s. It is unclear from the information provided whether gold mining occurred within the Glade Farm property (Lot 100 of the 1820 land lottery), though it apparently may have, as the area was later known as the Glades mine, and gold mining did occur along Flat Creek, which flows through the southeastern portion of Lot 100, and western portion of Land Lottery Lot 117. Also, from the information provided by the consultant, it appears that Dr. Banks and Mr. Branham were

SUBJECT: Boundary Justification for the Glades Farm (Rural Landscape) National Register-eligible Historic District, Glades Reservoir Water Supply Project, Hall County, DA Permit Application No. 2007-00388/HP-090713-002

co-owners of the property, just prior to Major Bell's ownership, suggesting a commercial interest.

Glades Farm is considered eligible under Criterion B, for its association with persons significant regionally in Georgia's past, including:

- 1) Dr. Richard Banks, a physician well-known among both the local white population and the Cherokee, and prominent in the gold mining industry of the time, operating several mines between 1833-1849; and
- 2) Major John Bell and family, a very prominent and successful farmer and large landowner, who was also active in the region's gold mining industry of the era.

The Glades Farm main residence is considered eligible under Criterion C, as a structure that embodies the distinctive characteristics of a type, period, method of construction, etc., although the original structure has been modified over the years, to its present form, which dates to the Late 19th or early 20th century, according to the 2002 TRC report. Although it had been modified, and expanded over time, as was frequently the case in much of the country for early farmstead houses --- particularly if the farm were successful and grew --- the TRC report recommended the structure eligible under Criterion C, and both the Savannah District and the GASHPO concurred. In its present form it is probably best described as "neo-classical" or "neo-Georgian."

Historical Era of Significance

Because the Glade Farm is associated with the 1820 Georgia Land Lottery, which followed soon after the Cherokee Land cessions, of 1817 and 1819, the western expansion of the Georgia frontier, the early establishment of mixed farming economy in the region, and with the north Georgia gold mining "boom" of the 1830s and 1840s, and its association with persons prominent in those endeavors during that era, its era of primary significance would seem to be from 1820, with its award during the land lottery, until the sale of the last remaining portions of the Bell family's property in 1866, when it passed into commercial ownership to the Glade Mining company. While gold mining efforts continued after that date, the significant era of gold mining in Georgia's history was from the time of its discovery in the Late 1820s until 1849, when the discovery of much larger gold fields in California eclipsed its significance. During this period (1829-1849) gold mining acted as a catalyst for settlement in the former Cherokee Territory.

SUBJECT: Boundary Justification for the Glades Farm (Rural Landscape) National Register-eligible Historic District, Glades Reservoir Water Supply Project, Hall County, DA Permit Application No. 2007-00388/HP-090713-002

Boundary Definition

Based on the qualifying criteria for eligibility in the National Register and the era of most prominent historical significance, the proposed boundary for the NRHP historic district is recommended to be the original 1820 Land Lot 100, awarded to James Floyd, and subsequently owned by him, briefly his father, then Dr. Richard Banks, and later Major John Bell, all figures prominent in the early history of the county, and associated with gold mining and farming. It was this lot that appears to have originally been established as the farm, upon which the main residence was built, and where the Bells resided. At the time of Narcissa Bell's death, or shortly before, she owned 150 acres of improved lands and 250 acres of unimproved lands (Land Lot 100 consisted of 250 acres); on the improved lands the family grew wheat, rye, oats, and tobacco. Although Major John Bell had acquired a substantial amount of land in adjacent land lots and bought out Dr. Banks' interest in the Glade Farm property, his widow sold off 1,000 acres, excepting the homestead, in 1851. Thus, the original Land Lot 100 would seem to be the property most associated with all of the qualifying criteria for the Glades Farm National Register eligibility, and the owners of prominence.

References

- Price, George D., Jeffrey Holland and James D'Angelo
2002 "Cultural Resources Survey of the Proposed 850-Acre Glades Reservoir on Flat Creek, Hall County, Georgia," Report prepared by TRC, Inc. of Atlanta, Georgia for CH2M Hill, of Atlanta, Georgia, and submitted to the U.S. Army Corps of Engineers, Savannah District, and the Georgia Department of Natural Resources (GADNR), Historic Preservation Division (HPD).
- 30 January 2015 AECOM Memorandum (Revised 10 February 2015) to Mr. Richard Morgan, Regulatory Division, Savannah District, USACE, concerning the boundary definition of the Glades Farm (Rural Agricultural Landscape) Historic District, Glades Reservoir Water Supply Reservoir Project, Hall County, Georgia
- 5 December 2015 AECOM Memorandum Mr. Richard Morgan, Regulatory Division, Savannah District, USACE, concerning the boundary definition of the Glades Farm (Rural Agricultural Landscape) Historic District, Glades Reservoir Water Supply Reservoir Project, Hall County, Georgia

SUBJECT: Boundary Justification for the Glades Farm (Rural Landscape) National Register-eligible Historic District, Glades Reservoir Water Supply Project, Hall County, DA Permit Application No. 2007-00388/HP-090713-002

- 29 April 2014 Letter from Dr. David Crass, Division Director and Deputy State Historic Preservation Officer, Historic Preservation Division, Georgia Department of Natural Resources, to Mr. Richard Morgan, Project Manager, Multi-Purpose Management Branch, Regulatory Division, Savannah District, replying to Savannah District's request for further comments on the additional Information and current site conditions relative to the Glade Farm and potential historic resource designated as Historic Resource E.
- 31 March 2014 Letter from Richard Morgan, Project Manager, Multi-Purpose Management Branch, Regulatory Division, Savannah District, to Dr. David Crass, Division Director and Deputy State Historic Preservation Officer, Historic Preservation Division, Georgia Department of Natural Resources, responding to GASHPO's comments and request for additional information, as expressed in their letter of 26 August 2009, relative to the TRC Cultural Resources Survey report dated 2002.
- 26 August 2009 Letter from Dr. W. Ray Luce, Deputy GASHPO, to Mr. Justin Hammonds, Project Manager, Piedmont Branch, responding to USACE letter of 21 July 2009, and providing SHPO comments on the National Register eligibility of the properties identified in the 2002 TRC report, and the proposed undertaking's effects to eligible properties.
- 21 July 2009 Letter from Mr. Justin Hammonds, Project Manager, Special Projects Section, Piedmont Branch, Regulatory Division, to Dr. Ray Luce, Division Director and Deputy State Historic Preservation Officer, Historic Preservation Division, Georgia Department of Natural Resources, requesting comments on the 2002 TRC Cultural Resources Survey report for the Glades Reservoir, and transmitting Savannah District Comments and recommendations. Only one comment was received concerning historic properties/cultural resources. It was a general comment indicating concern for archaeological resources and Native American Indian sites to the effect that these should be considered in the planning process. There were no public comments regarding the identification of or concern for specific historic properties (including archaeological sites).

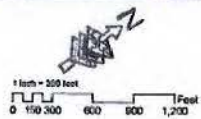
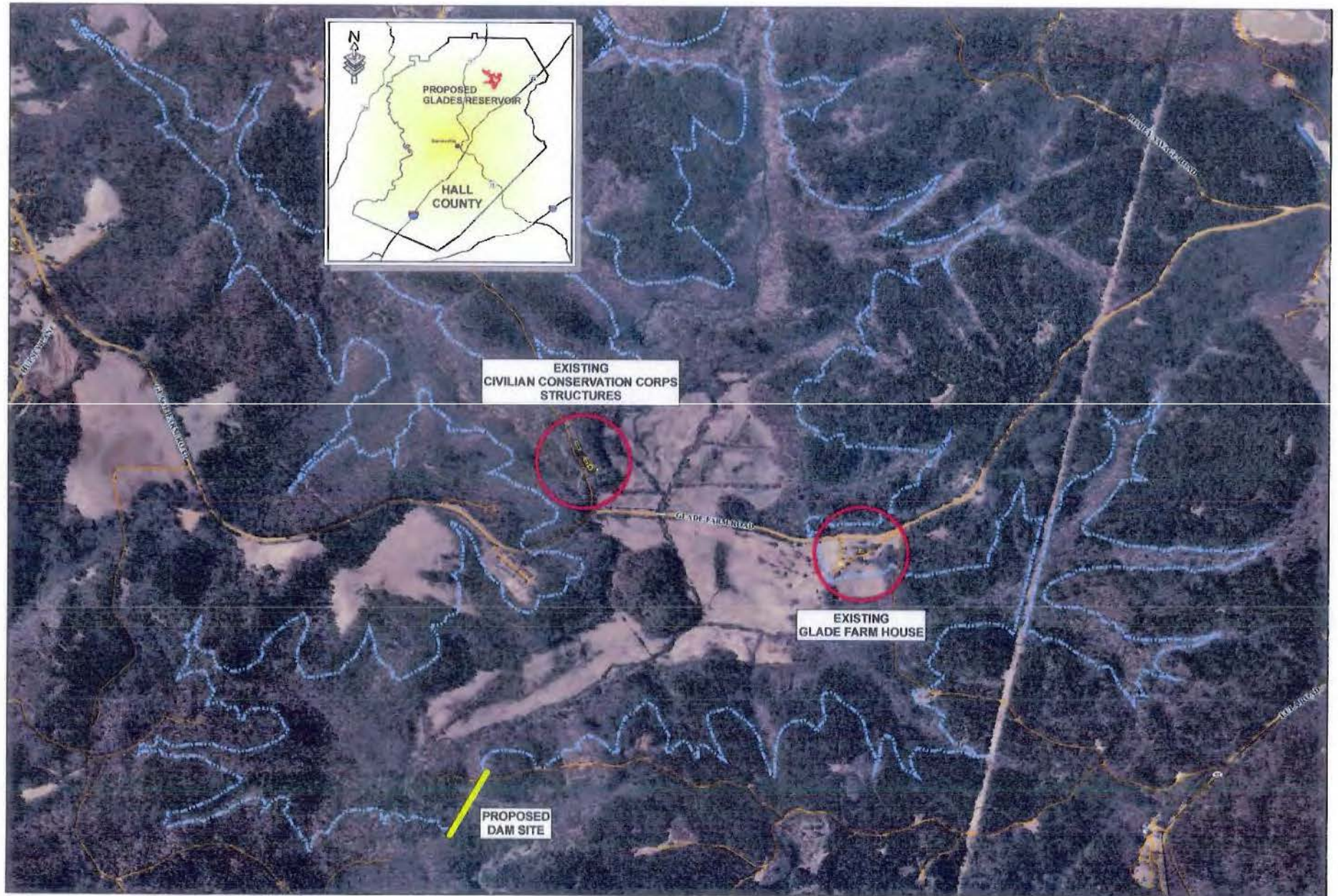
Glades Reservoir

Historic Structures & Landscape Sight Lines

March 2014

AECOM

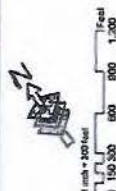
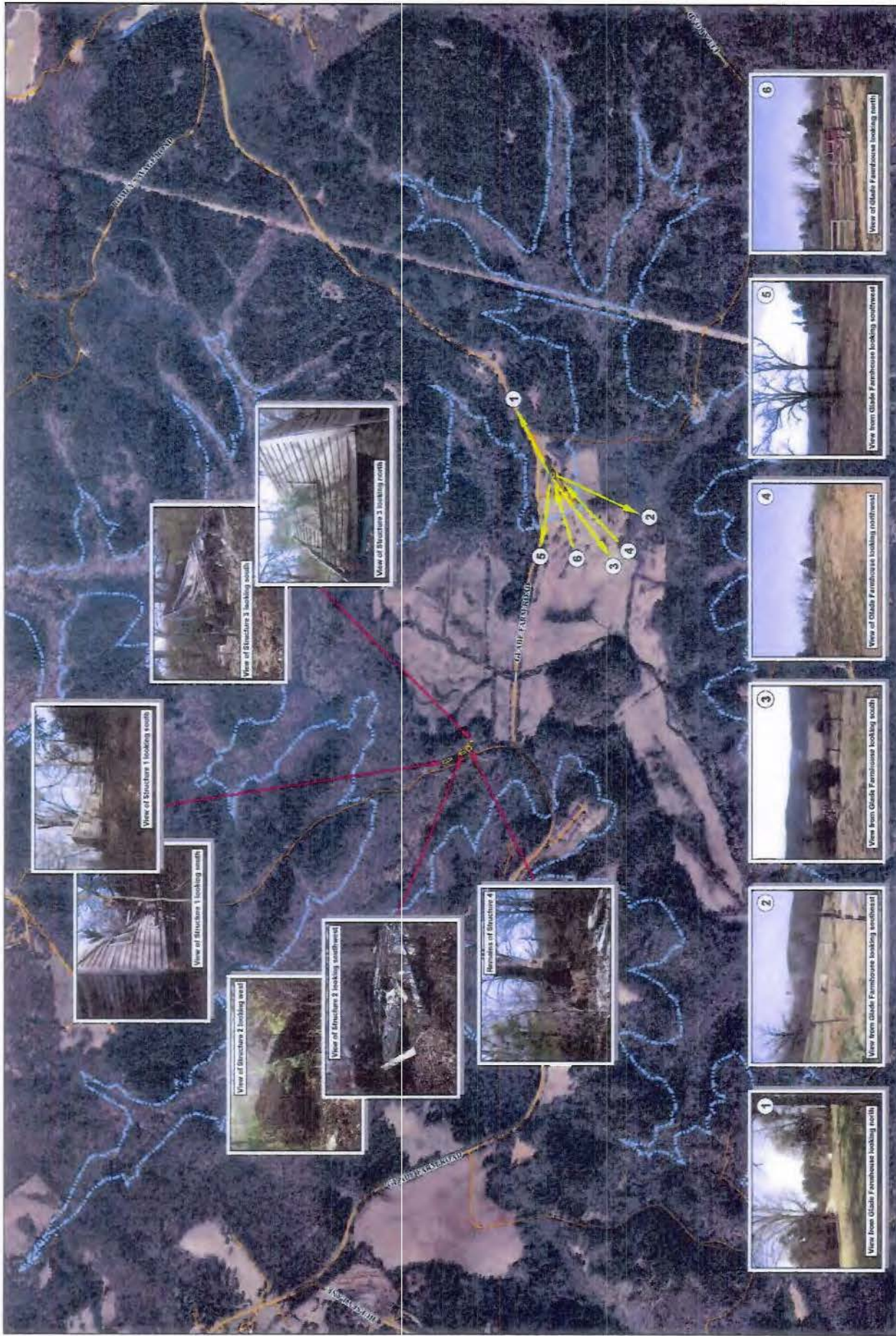
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Glades Reservoir

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Legend

Glades Reservoir Boundary Line 1980 ft. MSL

Glades Reservoir Boundary Line 1980 ft. MSL







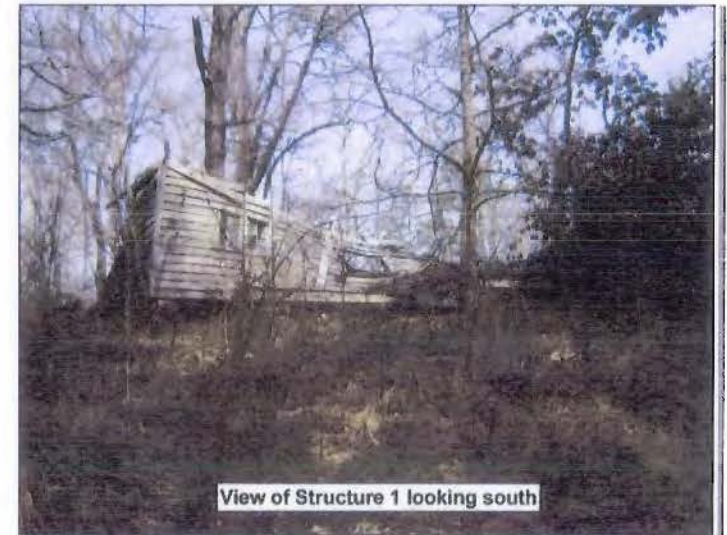
View from Glade Farmhouse looking southwest



View of Glade Farmhouse looking north



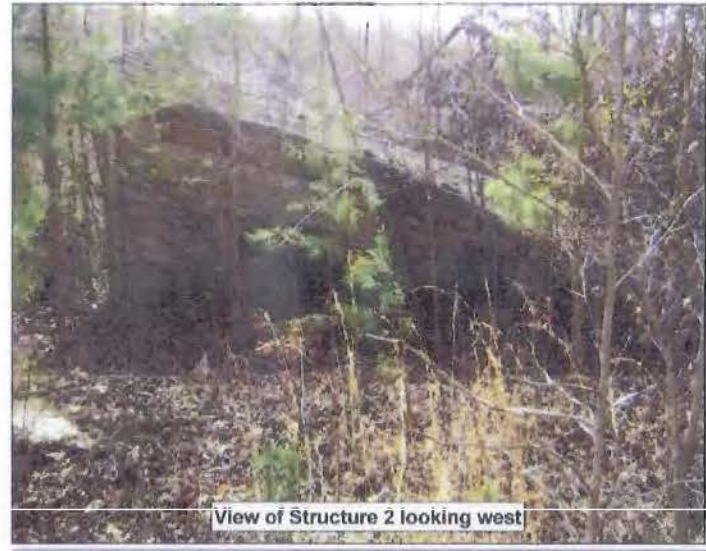
View of Structure 1 looking south



View of Structure 1 looking south



View of Structure 2 looking southwest



View of Structure 2 looking west



View of Structure 3 looking south



View of Structure 3 looking north



Remains of Structure 4



























HISTORIC STRUCTURES PROPERTY INFORMATION FORM

Property Identification: This property is identified as Resource 2 on Figure 1, Locator Map.

Location: The resource is situated on the southeast side of Glade Farm Road, approximately 1.8 miles east of Clarks Bridge Road (SR 284) in Hall County, Georgia (see Figure 2 below). It should be noted that the resource forms part of 5567 Glade Farm Road, a 5,622.44 acre-property (Hall County Tax Parcel 12100 000001), which includes the National Register of Historic Places (NRHP)-eligible Glade Farm House and the Mose Gordon Lumber Company Mess Hall, among other features.

Date(s) of Development: According to the current tenant of the residence at the Mose Gordon Lumber Company Mess Hall situated on the north side of Glade Farm Road opposite Resource 2, this property consists of two commercial chicken houses, possibly constructed in the early 1960's. The Mose Gordon Lumber Company Mess Hall tenant worked at the chicken houses as a contract grower for Cobb Hatcheries, and indicated that they were used to grow chickens to a marketable size for slaughter. These chicken houses were in use until about 10 years ago and are currently vacant (Dunckel 2014).

A review of historic aerial photos and topographic maps yields additional information about a potential construction date. Specifically, a 1963 aerial photo does not depict the chicken houses, and nor does a 1967 Agriculture Stabilization and Conservation Service aerial photo (NETR Online 1963; Agriculture Stabilization and Conservation Service 1967). The chicken houses are documented on United States Geological Survey (USGS) topographic quadrangle produced in 1986, but do not appear on the prior 1980 quadrangle (NETR Online 1980; 1986). Therefore, informational interviews and historic aerial photos and topographic maps do not yield consistent information regarding a construction date.

Resource 2 has not been highly altered, but the unoccupied buildings have deteriorated over time; the roofs and doors are in poor condition. In addition, modern plywood siding has been applied to the buildings at the gable ends.

Description: Resource 2 is situated within a cleared area on the southeast side of Glade Farm Road across the road from the Mose Gordon Lumber Company Mess Hall. The principal features on the property are two chicken houses. Photos 1 through 7 at the end of this form provide documentation of the property. The cleared area is surrounded by dense woods. The property is approached by a gravel access road that extends over 200 feet from the southeast side of Glade Farm Road. Several modern outbuildings are also situated on the property, including two sheds on the south side of the gravel road; small sheds north and south of the chicken houses, and a pen with small structures south of the chicken houses. In addition, two corrugated metal, conical-shaped poultry feed silos are appended to the north and south facades of each chicken house, respectively.

Both chicken houses share identical features. The single-story, rectangular plan buildings measure approximately 300 feet long and 44 feet wide. They rest atop concrete block foundations, and are capped by gable roofs sheathed in corrugated metal which has rusted because of lack of maintenance. The roofs of both chicken houses have exposed purlin and the

ridge lines are pierced by seven sheet metal ventilators. The gable ends on the east and west are clad in modern plywood boards, and are pierced by double wood doors; some of the doors have deteriorated or been removed. The north and south, or side facades, consist of concrete block bases, topped by chicken wire that links the base to the roof beams. The chicken wire functions as windows that allow sunlight into the buildings. A small square-plan addition capped by a shed roof is appended to the northeast corner of the east façade. The interior of the chicken houses features an exposed structural system. Braced wood posts and beams support the wood roof trusses.

Historic Context: Prior to 1818, the territory that comprises present-day Glade Farm in Hall County, Georgia belonged to the Cherokee Nation. The indigenous people ceded the landmass of Appling, Early, Gwinnett, Habersham, Hall, Irwin, Rabun, and Walton counties to the State of Georgia and the lottery acts of 1818 and 1819 established all the above named counties, and set forth the terms for selling off the land in Hall County in 250-acre parcels using a lottery scheme. The lottery occurred in between September and December 1820 (Georgia State Archives website, 1820 Lottery webpage). Absentee landowners won some of the parcels and never resided on their property. Siblings John and Enoch Rogers became the first inhabitants to live in northern Hall County. Enoch, having married a Cherokee woman, moved with the Cherokee as their lands disappeared. The discovery of gold in and around northern Hall County in 1832 led to the 1838 total expulsion of Cherokees from their lands, sparking the beginning of the Trail of Tears as the tribe left their ancestral lands in Georgia and headed for present-day Oklahoma. Subsequent to finding gold, diamonds began to be found in the same area (Head 1997:18-21).

By the time of his death in 1864, John's oldest son, Jacob Rogers, had acquired 750 acres of land—the equivalent of three lottery parcels. After Jacob's wife died in 1872, their son, Dr. J.T. Rogers inherited the property. Either J.T. or his father constructed a small hotel near Glade Shoals. During the late nineteenth and into the twentieth century, mountain resort hotels became popular and provided an opportunity for the landed gentry to escape urban life. In 1894, Dr. Rogers sold his land interests to a Brooklyn, New York, syndicate headed by Abraham Gould Jennings. The syndicate came for the diamonds and precious metals and abandoned the hotel. The area became known as Glade Mine and Jennings resided in the Glade Farm House (HL105) located about a mile below the shoals (Head 1997:23). Concerning Jennings, the 1909 *Second Report on Gold Deposits of Georgia* notes,

“Considerable placer work was done before the Civil war on lots 116 and 117 along Stockeneter Branch. A portion of this placer deposit on lot 117 was re-worked by A.G. Jennings about 1880. Panning tests made from a fringe of unworked gravels near the edge of the extensive Flat Creek lowlands yielded very satisfactory results, the gold obtained being rather coarse. Whether there occurs along this branch much placer area that could be re-worked at a profit could only be determined by more extensive tests than it was practicable to make at the time of visit.” (Jones 1909:124)

After extracting what gold he obtained easily, Jennings sold 775 acres in 1906 to James H. Hunt, who then owned the Hunt Hotel in Gainesville. The land deal included lottery lots 78 and 79, straddling Flat Creek, approximately 3 miles upstream from the Mose Gordon Lumber Company Mess Hall (Head 1997:23). Over the years, Hunt added thousands of acres to his holdings in

upper Hall County as he became the wealthiest resident of the county and also its largest property taxpayer (Vardeman 2006).

James Hunt died intestate, but had mentioned to his attorney that he wanted some of his land dedicated to education. All of his real and personal property passed to his wife, Aurora Strong Hunt. She died in 1927 and in her Last Will and Testament, she bequeathed \$100,000 and devised 5,500 acres of the Glade Farm property to the University of Georgia for the establishment of an industrial school in her husband's memory for training "mountain boys of north Georgia" (*Augusta Chronicle* 1927:A1). During James Hunt's lifetime, he had granted permission to the university to establish camps on the lottery lot 78 for forestry research. The school reportedly built a house and a lake on this lot (Head 1997:23). Despite the free use of the property and the gift of 5,500 acres, the University of Georgia failed in its charge to develop an industrial school. Aurora Hunt's Last Will and Testament specified that the university could sell the land if it did not build an industrial school, with the proceeds of the land sales going for scholarships to educate underprivileged youth. In 1942, the University of Georgia auctioned the 5,500 acres to Mose Gordon for \$94,335 (Vardeman 2006; Head 1997:58).

The Mose Gordon Lumber Company conducted logging and farming operations on the land and apparently established a logging base camp around Glade Lake. The buildings associated with the camp stood in the woods north of Glade Farm Road and along a dirt road extending from Glade Farm Road, over the dam for Glade Lake and connecting with Sullens Road (TRC 2002). This dirt road apparently received the name Mose Gordon Road. In 1944, Mose Gordon provided a lease for land to the Northeast Georgia Council of the Boy Scouts of America. The council established a camp initially named Camp Mose Gordon, later renamed Cheonda (Head 1997:58; BSA Troop 26 2010; Greene and Smith 2012:229). The location of this camp could not be verified; however, one attendee of the camp notes, "There was a caretaker on the farm who was a crusty old gold miner that lived in a cabin by a creek" (Greene and Smith 2012:229).

Mose Gordon died in 1971 (Ancient Faces no date). As previously indicated in the Date(s) of Development section, despite the fact that the current tenant of the Mose Gordon Lumber Company Mess Hall states that the chicken houses at Resource 2 may have been built in the early 1960s prior to Gordon's death, it is more likely that the chicken houses were erected after Mose Gordon's death based on historic aerial photos and topographic maps. In 1978, Gordon's heirs sold the property to Count Karl Mayr-Meinhof of Austria (Head 1997:58). The Mayr-Meinhof family purchased the property as an investment, and engaged in timber harvesting (Weinman 2009). Glade Farm, LLC, operates the farm today.

National Register Recommendation: The property is considered **Not Eligible** for inclusion in the NRHP.

National Register Criteria and Level of Significance: Resource 2 was evaluated for eligibility for listing in the NRHP using the NRHP Criteria for Evaluation as outlined in 36 CFR Part 60.4. It is likely that chicken houses were erected after Mose Gordon's death in 1971. Therefore, there was no basis for evaluating the property under Criterion B; however, based on an oral history from a local tenant, these chicken houses were constructed in the early 1960s. As such, this assessment was conducted. There are no known associations with individuals whose specific contributions to history can be identified and documented with this property. No associations

were indicated or suggested as a result of background research on the project area, or in an interview with tenant who occupies the Mose Gordon Lumber Company Mess Hall and worked in the chicken houses at Resource 2.

Also, there are no indications that the property is likely to yield information on important research questions in history or prehistory. This property does not appear to have the potential to be the principal source of important information. Therefore, there was no basis for evaluating the property under Criterion D.

Resource 2 was evaluated under Criterion A within the broader historical context of mid-twentieth century poultry farming operations in Hall County. The resource was evaluated in this context because two chicken houses are located on the property, and research indicates that poultry farming has played a significant role in the economic and agricultural development of Hall County during the mid-twentieth century. Specifically, after the destructive Gainesville tornado of 1936, and advent of World War II (1941-1945), Gainesville became the locus for the rise of the poultry industry in Georgia. During the Great Depression (1929-1941), Gainesville seed-and-feed store operator Jesse Jewell bought baby chicks and supplied them and chicken feed on credit to cash-poor farmers. When the chicks were grown, Jewell bought them back at a price that covered his feed costs and also guaranteed the farmers a profit.

Numerous Hall County farmers entered into contracts to grow chickens for Jewell, and by the late 1930s, he added elements that would make J.D. Jewell the largest integrated chicken producer in the world during the mid-twentieth century. These included large-scale growing and processing, and production of frozen chickens for the marketplace (Weinberg 2005). Currently, Georgia is leader in poultry production, and several major producers are located in Hall County, including Gress Foods, King's Delight, Mar-Jac Poultry, and Pilgrim's Pride (Gurr 2004)

According to the tenant at the Mose Gordon Lumber Company Mess Hall, up until around 2004, he grew chickens at the chicken houses at Resource 2 under contract to Cobb Hatcheries (Dunckel 2014). Cobb Hatcheries, currently known as Cobb, began as a poultry breeding business in Massachusetts in 1916. In 1956, Cobb participated in its first U.S. Poultry & Egg Expo in Atlanta. By the 1980s, Cobb formed a joint venture with Tyson Foods, a major chicken producer, and its headquarters relocated from Massachusetts to Arkansas. In 1994, Cobb opened a hatchery in Cleveland, Georgia, thereby increasing its presence in the state. Prior to 2004 when chickens were cultivated under contract for Cobb at Resource 2, the company had grown into a global poultry enterprise engaged in the development, production, and sale of broiler breeding stock (Cobb-Vantress no date). Therefore, it is assumed that Resource 2 was typical of the many chicken breeders who worked under contract to Cobb in Georgia, and most likely did not have a unique relationship with the company.

Tilling the Earth provides valuable guidance for assessing agricultural properties under Criterion A in Georgia. To be considered historically significant under this criterion, a property should be directly associated with one or more of the historic time periods/themes in Georgia's agricultural context (Messick et. al 2001). Temporally, the chicken houses at Resource 2 are most closely associated with the theme entitled "1920-1950: The Death of King Cotton and the Birth of Successful Agricultural Diversity." As previously mentioned, the poultry industry gained in prominence during the early decades of the twentieth century, and by the 1940s, J.D. Jewell of

Gainesville successfully expanded and promoted the poultry industry in that area into a vertically integrated business. According to *Tilling the Earth*, in the 1940s, the size of most chicken farms was limited to no more than 5,000 broilers; however, by the 1960s operations with 100,000 to 200,000 birds were common (Messick et al 2001).

Resource 2 is not recommended NRHP-eligible under Criterion A for several reasons. The chicken houses were constructed in the early 1960s or later based on interviews and a review of historic aerial photos and topographic maps. Therefore, they were constructed after 1950, the terminal date of the period of significance for agricultural diversity cited in *Tilling the Earth*. In addition, the chicken houses are commonplace structures in Hall County because of its prominent role in the poultry industry, and these are not the best examples of this type in the region.

Resource 2 was also evaluated under Criterion C. The chicken houses are common examples of late-twentieth century standard chicken houses, and have several typical features, including an open structural system, and a long, low gentle-pitched, gable-roof building (Messick et. al 2001). The buildings are not architecturally distinctive, and modern plywood siding clads the gable ends. In addition, select building elements, including the corrugated metal roofs, doors, and siding, are in poor condition, and therefore compromises its ability to convey architectural significance. Therefore, Resource 2 is not recommended NRHP eligible under Criterion C.

Integrity: Resource 2 possesses integrity in the area of location and setting because the chicken houses are situated in their original site of construction, and their spatial relationship to one another is intact. However, Resource 2 does not possess integrity of design, materials, workmanship, feeling, or association. The buildings are in poor condition, including rusted roofs, and deteriorated or removed doors. Modern plywood siding has also been applied to the gable ends. The buildings, which may be less than 50 years old, also lack a strong sense of historic feeling and association.

Proposed Boundary (Justification and Description): Not applicable

UTM Coordinates: 7.5 Minute Series Topographic Map. Lula, Georgia Quadrangle, Zone 17N, Northing: 248360.6; Easting: 3812039.9

Prepared: Completed pursuant to 36 CFR Part 800.4(b & c) for compliance with Section 106 of the National Historic Preservation Act of 1966, as amended for Glades Water Supply Reservoir Project, Hall County Georgia, DA Permit Application No. 2007-00388 by:

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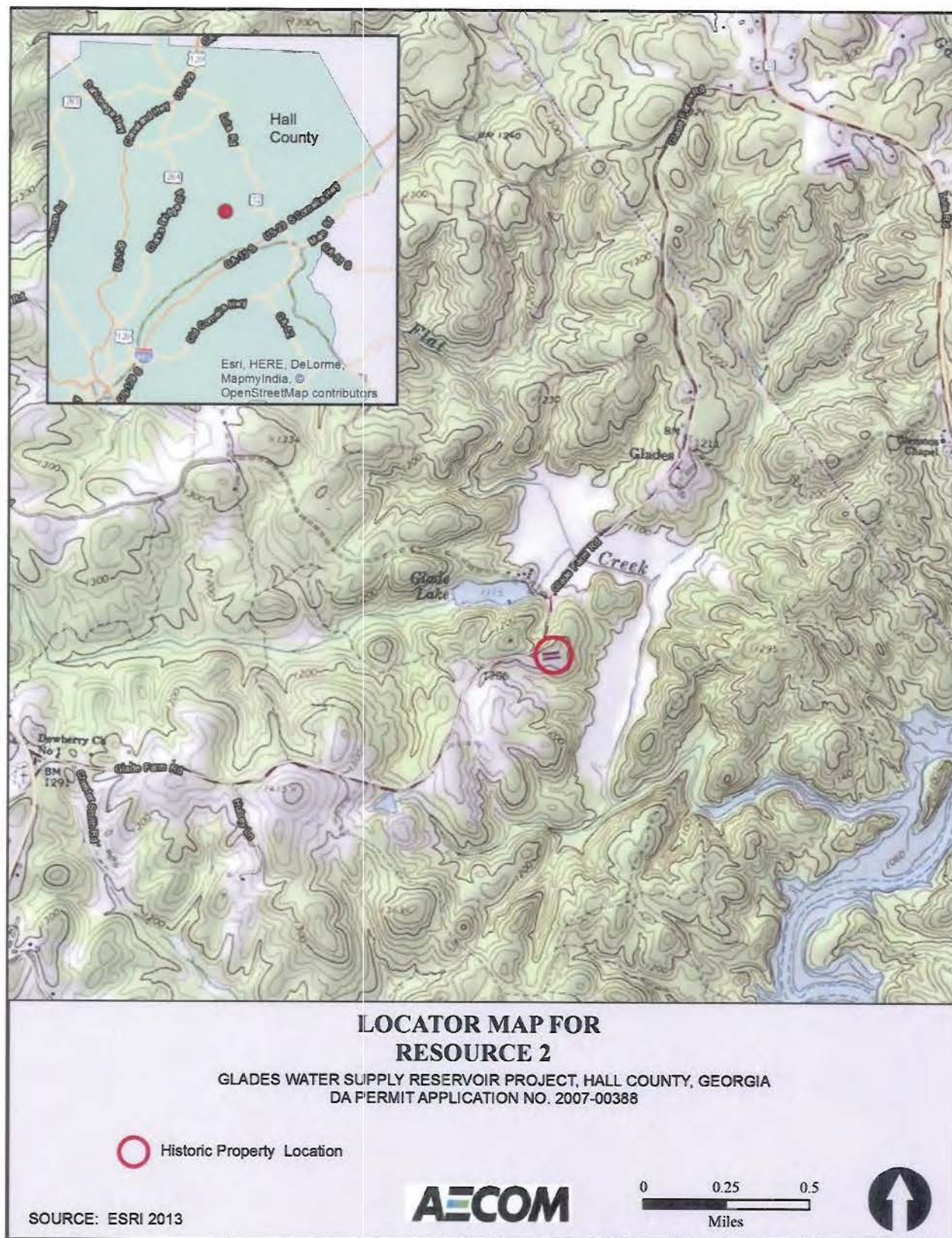


Figure 1



SITE GRAPHIC FOR RESOURCE 2

GLADES WATER SUPPLY RESERVOIR PROJECT, HALL COUNTY, GEORGIA
DA PERMIT APPLICATION NO. 2007-00388

SOURCE: ESRI 2013

AECOM

0 100 200 400
Feet



Figure 2



Photo 1: View of west façade of northern chicken house.



Photo 2: View of south façade of northern chicken house.



Photo 3: View of south façade of northern chicken house looking east toward feed silo.



Photo 4: View of north façade of southern chicken house. Note feed silo in background.



Photo 5: View of interior of chicken house; note exposed structural system.



Photo 6: View of interior of chicken house; note open fenestration sheathed in chicken wire.



Photo 7: View of interior of chicken house; note open fenestration sheathed in chicken wire and section of door in foreground.

HISTORIC STRUCTURES PROPERTY INFORMATION FORM

Property Identification: This property is identified as the Mose Gordon Lumber Company Mess Hall on Figure 1, Locator Map.

Location: The resource is situated on the north side of Glade Farm Road, approximately 1.7 miles east of Clarks Bridge Road (SR 284) in Hall County, Georgia (see Figure 2, Site Graphic for Mose Gordon Lumber Company Mess Hall). It should be noted that the resource forms part of 5567 Glade Farm Road, a 5,622.44-acre property (Hall County Tax Parcel 12100 000001) which includes the National Register of Historic Places (NRHP)-eligible Glade Farm House and Resource 2 (chicken houses), among other features.

Date(s) of Development: The current tenant of the Mose Gordon Lumber Company Mess Hall, Kjelmon (Bob) Sullens, has resided at the property for 44 years, while other members of his family live on Sullens Road, northwest of Glade Farm Road. During an interview with Mr. Sullens, he indicated that the Mose Gordon Lumber Company Mess Hall may have been constructed as a mess hall, but he also thought it served as a small Civilian Conservation Corps (CCC) camp in the 1930s (Dunckel 2014). A review of historic aerial photographs and maps indicate that the Mose Gordon Lumber Company Mess Hall did not exist prior to 1940, despite Hall County property tax records indicating the building dates to 1932 (Hall County Georgia, no date). The 1947 historic aerial photograph depicts the Mose Gordon Lumber Company Mess Hall (Historic Aerials website). In addition, research indicates that after 1939, the CCC shifted from public projects to defense projects as the country geared up for World War II (1941-1945) (CCC Legacy website). Therefore, it is unlikely that the Mose Gordon Lumber Company Mess Hall functioned as a CCC building during the 1930s.

Mr. Sullens further stated that the Hunt family owned the property during the 1930s, which is incorrect, because the Last Will and Testament of Aurora Hunt had already devised the land to the University of Georgia in 1927 (see Historic Context, below). Mr. Sullens reported that several small living quarters surrounded the Mose Gordon Lumber Company Mess Hall, but none are evident today. However, these small living quarters can be seen scattered in the woods surrounding the Mose Gordon Lumber Company Mess Hall on the 1947 aerial photograph (Historic Aerials website).

Additionally, Mr. Sullens indicated that the Mose Gordon Lumber Company Mess Hall may have been used by the University of Georgia for research in the 1930s and 1940s (Dunckel, 2014). Research did not confirm this assertion. All evidence consulted indicates that the university established its camp on lot 78 near Flat Creek, located over 3 miles northwest of lot 117, the site of the Mose Gordon Lumber Company Mess Hall (see Historic Context, below). Furthermore, Mr. Sullens mentioned the property was used as a summer rental residence during the 1940s and 1950s. He also noted that the property may have been used as a camping site by the Boy Scouts and the University of Georgia during this period (Dunckel 2014).

The Mose Gordon Lumber Company Mess Hall has not been highly altered over time. Historic aerial maps indicate that a rectangular-plan addition was appended to the northwest corner of the building between 1947 and 1963 (Historic Aerials website). Field survey conducted in October

2014 indicates that a section of the north, or rear façade is blocked by what appears to be concrete and wood. A flight of dilapidated brick steps is situated north of the blocked portion of the façade. Overall, the Mose Gordon Lumber Company Mess Hall is in fair condition.

Description: The Mose Gordon Lumber Company Mess Hall is situated within a densely wooded setting, approached by a gravel road that curves 623 feet northeast from the north side of Glade Farm Road. Photos 1 through 10 at the end of this form document the property. It is a single-story, H-plan, frame building on a brick foundation with concrete block patches. A single-story rectangular-plan addition is appended to the northwest corner. The residence is clad in weatherboard siding, and is capped by an intersecting gable roof sheathed in corrugated metal with overhanging eaves. The core is six bays long and three bays wide; the addition is two bays long. Although it does not fit into a clear typology established by Georgia State Historic Preservation Office (SHPO) in *House Types in Georgia*, it shares some characteristics of an early-twentieth century double-pen house with No Academic Style, including two doors on the main façade and gable roof.

The south façade is the principal façade, and is characterized by a central cutaway porch supported by three square wood columns with capitals, set upon brick piers. Concrete blocks with vent grates extend between the piers, and create a crawl space. The porch is sheltered by a corrugated metal shed roof with exposed rafters. Concrete steps access the porch. The corners of the façade consist of front-gable projections, pierced by paired six-over-six windows in wood surrounds. The recessed portion of the façade is pierced by two paired sash windows, one sash window, and paired five-panel doors in a wood surround.

Doors in wood surrounds also occur on the east and west facades of the corner projections on the south facade, and link them directly to the porch. Similarly, wood panel doors also occur on the east and west facades of the corner projections on the north façade. These doors may lead to separate residences within the building.

The east and west, or side facades of the residence are generally pierced by paired and single six-over-six double-hung sash in wood surrounds. A window is blocked on the west façade to accommodate an exhaust pipe. A small two-over-two double-hung sash in a wood surround pierces the east façade, and appears to have replaced a door based on the unevenly applied siding beneath the window. The rear or north façade is also pierced by paired double-hung sash and a door in wood surrounds.

The addition at the northwest corner consists of an open-air section sheltered by a corrugated-metal-clad gable roof. The terminus of the addition consists of a two-bay section pierced by wood panel door and a six-over-six double-hung sash on the west façade.

Historic Context: Prior to 1818, the territory that comprises present-day Glade Farm in Hall County, Georgia belonged to the Cherokee Nation. The indigenous people ceded the landmass of Appling, Early, Gwinnett, Habersham, Hall, Irwin, Rabun, and Walton counties to the State of Georgia and the lottery acts of 1818 and 1819 established all the above named counties, and set forth the terms for selling off the land in Hall County in 250-acre parcels using a lottery scheme. The lottery occurred in between September and December 1820 (Georgia State Archives

website, 1820 Lottery webpage). Absentee landowners won some of the parcels and never resided on their property. Siblings John and Enoch Rogers became the first inhabitants to live in northern Hall County. Enoch, having married a Cherokee woman, moved with the Cherokee as their lands in the east disappeared. The discovery of gold in and around northern Hall County in 1832 led to the 1838 total expulsion of Cherokees from their lands, sparking the beginning of the Trail of Tears as the tribe left their ancestral lands in Georgia and headed for present-day Oklahoma. Subsequent to finding gold, diamonds began to be found in the same area (Head 1997:18-21).

By the time of his death in 1864, John's oldest son, Jacob Rogers, had acquired 750 acres of land—the equivalent of three lottery parcels. After Jacob's wife died in 1872, their son, Dr. J.T. Rogers inherited the property. Either J.T. or his father constructed a small hotel near Glade Shoals. During the late nineteenth and into the twentieth century, mountain resort hotels became popular and provided an opportunity for the landed gentry to escape urban life. In 1894, Dr. Rogers sold his land interests to a Brooklyn, New York, syndicate headed by Abraham Gould Jennings. The syndicate came for the diamonds and precious metals and abandoned the hotel. The area became known as Glade Mine and Jennings resided in the Glade Farm House (HL105) located about a mile below the shoals (Head 1997:23). Concerning Jennings, the 1909 *Second Report on Gold Deposits of Georgia* notes,

“Considerable placer work was done before the Civil war on lots 116 and 117 along Stockeneter Branch. A portion of this placer deposit on lot 117 was re-worked by A.G. Jennings about 1880. Panning tests made from a fringe of unworked gravels near the edge of the extensive Flat Creek lowlands yielded very satisfactory results, the gold obtained being rather coarse. Whether there occurs along this branch much placer area that could be re-worked at a profit could only be determined by more extensive tests than it was practicable to make at the time of visit.” (Jones 1909:124)

After extracting what gold he obtained easily, Jennings sold 775 acres in 1906 to James H. Hunt, who then owned the Hunt Hotel in Gainesville. The land deal included lottery lots 78 and 79, straddling Flat Creek (Head 1997:23), approximately 3 miles upstream of the Mose Gordon Lumber Company Mess Hall. Over the years, Hunt added thousands of acres to his holdings in upper Hall County as he became the wealthiest resident of the county and also its largest property taxpayer (Vardeman 2006).

James Hunt died intestate, but had mentioned to his attorney that he wanted some of his land dedicated to education. All of his real and personal property passed to his wife, Aurora Strong Hunt. She died in 1927 and in her Last Will and Testament, she bequeathed \$100,000 and devised 5,500 acres of the Glade Farms property to the University of Georgia for the establishment of an industrial school in her husband's memory for training “mountain boys of north Georgia” (*Augusta Chronicle* 1927:A1). During James Hunt's lifetime, he had granted permission to the university to establish camps on the lottery lot 78 for forestry research. The school reportedly built a house and a lake on this lot (Head 1997:23). Despite the free use of the property and the gift of 5,500 acres, the University of Georgia failed in its charge to develop an industrial school. Aurora Hunt's Last Will and Testament specified that the university could sell

the land if it did not build an industrial school, with the proceeds of the land sales going for scholarships to educate underprivileged youth. In 1942, the University of Georgia auctioned the 5,500 acres to Mose Gordon for \$94,335 (Vardeman 2006; Head 1997:58).

The Mose Gordon Lumber Company conducted logging and farming operations on the land and apparently established a logging base camp north of the Mose Gordon Lumber Company Mess Hall as documented on a 1937 soil map of Hall County (TRC 2002; Head 1997). After 1940, the man-made Glade Lake was created near the camp according to the 1947 historic aerial photo (Historic Aerials website). The logging camp stood in the woods north of Glade Farm Road, along a dirt road that extended from Glade Farm Road, over the dam for Glade Lake, and connected to Sullens Road (TRC 2002), located north and west of the Mose Gordon Lumber Company Mess Hall. This dirt road apparently received the name Mose Gordon Road (Georgia Public Notice 2012). A cultural resources survey conducted by TRC in 2002 documented the wood frame buildings as 'Property E.' They were standing but in poor condition at the time of TRC's 2002 survey. One building, designated Structure 4, shared the same H-plan form and massing as the Mose Gordon Lumber Company Mess Hall. The Property E logging camp buildings are no longer extant based on a field survey conducted in 2014 (Morgan, March 31, 2014). However, during a field survey conducted 12 years prior in 2002, the wood frame buildings were standing in poor condition, and one building, categorized as Structure 4, shared the same H-plan form and massing as the Mose Gordon Lumber Company Mess Hall.

In 1944, Mose Gordon provided a lease for land to the Northeast Georgia Council of the Boy Scouts of America. The council established a camp initially named Camp Mose Gordon, later renamed Cheonda (Head 1997:58; BSA Troop 26 2010; Greene and Smith [2012]:229). The location of this camp could not be verified; however, one attendee of the camp notes, "There was a caretaker on the farm who was a crusty old gold miner that lived in a cabin by a creek" (Greene and Smith 2012:229).

As indicated in the Date(s) of Development section, the Mose Gordon Lumber Company Mess Hall was erected by 1947 according to historic aerial photos. It was likely built as a mess hall for the Mose Gordon Lumber Company according to the current tenant (Dunckel 2014). Both the current tenant and 1947 aerial photo indicate that the Mose Gordon Lumber Company Mess Hall was surrounded by several small living quarters which are no longer extant (Dunckel 2014; Historic Aerials website).

Mose Gordon died in 1971 (Ancient Faces no date). Gordon's heirs sold the property to Count Karl Mayr-Meinhof of Austria (Head 1997:58). In 1978, the Mayr-Meinhof family purchased the property as an investment, and engaged in timber harvesting (Weinman, December 27, 2009). Glade Farm, LLC, operates the 5,622.44-acre farm today.

National Register Recommendation: The Mose Gordon Lumber Company Mess Hall property is considered **Eligible** for inclusion in the NRHP. Its period of significance extends from 1942, the year that Mose Gordon purchased the property, to 1971, the year of Mose Gordon's death.

National Register Criteria and Level of Significance: The Mose Gordon Lumber Company Mess Hall was evaluated for eligibility for listing in the NRHP using the NRHP Criteria for

Evaluation as outlined in 36 CFR Part 60.4. *Tilling the Earth* provides valuable guidance for assessing properties under Criterion A in Georgia:

“In the twentieth century trees began to be considered as a major crop. Because of the reckless management of timberlands in the nineteenth century, Georgia’s timber and naval stores industry was in distress by 1904. In 1920 the United States Forest Service stated that almost all of Georgia’s virgin timber was gone and it was predicted that within ten years all of the big saw mills would be out of existence. It was this crisis that led to better forest management and in the ensuing thirty years the state experienced a minor revolution. In 1921 the state created the Georgia State Board of Forestry, which worked to control, fires and promote reforestation. The Federal government increased its cooperation with the states and then the New Deal brought in large programs of conservation, reforestation, and research. After the low point in the Great Depression, the lumber and naval stores industries became prosperous and before the mid-century, lumber cutting was at a record high of two billion board feet per year. Reforestation was going on at such a pace that plantings were keeping up with the demand for wood products. Naval stores productions peaked around 1930 and then levels dropped during World War II. Afterwards, production was up again to about 242,000 barrels at the end of the forties. A new development in the forestry industry was an interest in pulp for paper mills...Union Bag and Paper Corporation opened its first mill in Savannah in 1936, and by 1950 six more mills were opened. The market for pulpwood grew and production jumped from 47,000 cords in 1935 to more than 2,300,000 cords in 1950” (Messick October 1, 2001).

Based on the Mose Gordon Lumber Company Mess Hall’s connection to the mid-twentieth century lumber industry in Hall County and the Mose Gordon Lumber Company, the Mose Gordon Lumber Company Mess Hall is recommended NRHP-eligible under Criterion A.

Under Criterion B, the Mose Gordon Lumber Company Mess Hall possesses significance for its association with Mose Gordon, owner of the Glade Farm property from 1942 until his death in 1971. Mr. Gordon, a lumberman, was a prominent land owner in Hall County, given the scale of the 5,500-acre property of which the Mose Gordon Lumber Company Mess Hall formed a part.

Under Criterion C, the Mose Gordon Lumber Company Mess Hall survives as a good example of an early-twentieth century double-pen house with No Academic Style. Although it was most likely erected as a mess hall, it incorporates residential vocabulary as evidenced by its domestic-scale H-plan form, porch, wood doors, and multi-pane double-hung sash windows. These features have enabled to be easily converted to serve residential purposes. Additionally, the Mose Gordon Lumber Company Mess Hall appears to be the last surviving intact building associated with the Mose Gordon Lumber Company. Other buildings associated with the company near Glade Lake (i.e., ‘Property E’ documented by TRC in 2002) are no longer extant, including Structure 4, the early-twentieth century H-plan building which most closely resembles the form and massing of the Mose Gordon Lumber Company Mess Hall. Therefore, the resource has a somewhat unique status because it has survived to present time.

Under Criterion D, the Mose Gordon Lumber Company Mess Hall has the potential to yield information regarding the property's former function as a mess hall for the Mose Gordon Lumber Company, and other subsequent uses. As indicated in the Date(s) of Development and Historic Context sections, several small living quarters were situated near the Mose Gordon Lumber Company Mess Hall and are no longer extant. An archaeological survey of the property may yield historic archaeological information about the role of this property in the Glade Farm region.

Integrity: The Mose Gordon Lumber Company Mess Hall has been determined to possess integrity in the areas of location, design, setting, materials, and workmanship. The resource is located on its original site of construction, its H-plan design has not been highly altered, its wooded setting remains primarily intact, and it conveys virtually all of its original material features and mid-twentieth century workmanship. The Mose Gordon Lumber Company Mess Hall does not strongly convey feeling and association. It currently functions as a residence; therefore, its connection to its likely past as a mess hall to a non-extant lumber company camp near Glade Lake has been somewhat diminished.

Proposed Boundary (Justification and Description): The proposed NRHP boundary of the Mose Gordon Lumber Company Mess Hall forms small triangular shape around the former mess hall which now functions as a residence because it is situated within an over 5,000-acre tax parcel which would be too ample to serve as the boundary for such a small-scale resource. The proposed boundary begins at the intersection of the gravel driveway and the north side of Glade Farm Road, follows the driveway to the residence, extends around the residence, and then travels in a northeasterly direction toward the north side of Glade Farm Road. It then travels along the north side of Glade Farm Road to the place of beginning. The proposed boundary includes the residence, the driveway, and a small amount of woodland around the property to convey its setting. The boundary encompasses approximately 3.11 acres.

UTM Coordinates: 7.5 Minute Series Topographic Map. Lula, Georgia Quadrangle, Zone 17N, Northing: 248171.9; Easting: 3812116.5.

Prepared: Completed pursuant to 36 CFR Part 800.4(b & c) for compliance with Section 106 of the National Historic Preservation Act of 1966, as amended for Glades Water Supply Reservoir Project, Hall County Georgia, DA Permit Application No. 2007-00388 by:

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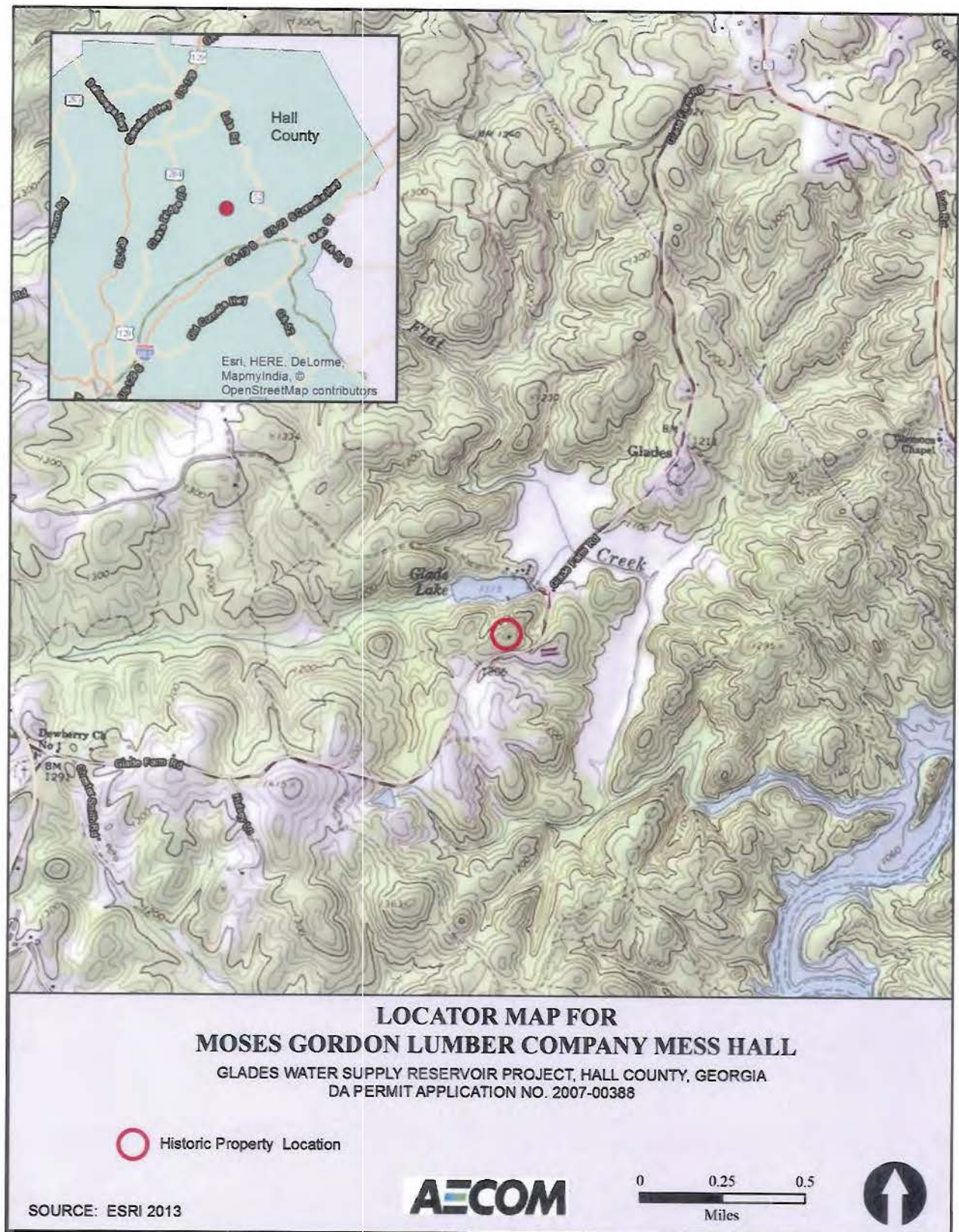




Figure 1



**SITE GRAPHIC FOR
MOSES GORDON LUMBER COMPANY MESS HALL**
GLADES WATER SUPPLY RESERVOIR PROJECT, HALL COUNTY, GEORGIA
DA PERMIT APPLICATION NO. 2007-00388

 Proposed Historic
Property Boundary

 Photo angle and location

SOURCE: ESRI 2013

AECOM

0 50 100 200
Feet



Figure 2



Photo 1: View looking toward southwest corner of south façade. Note paired six-over-six double-hung sash.



Photo 2: View of cutaway porch on south façade.



Photo 3: View of porch and southeast corner of south façade.



Photo 4: View of central paired five-panel wood door on south façade.



Photo 5: View of exposed rafters of porch on south façade.



Photo 6: View of west façade and blocked window.



Photo 7: View of west façade and open section of addition at northwest corner.



Photo 8: View of addition and open section. Note standing seam metal roof.



Photo 9: View of east façade. Note weatherboard siding.



Photo 10: View of junction of H-plan on north façade and open section of addition with gable roof.